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THE
UNIVERSITY
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DIVISION OF RESEARCH
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DEVELOPMENT

COVER STORY

**ENGAGE, EDUCATE,
EMPOWER: The Three E's
of Tick Disease Prevention**
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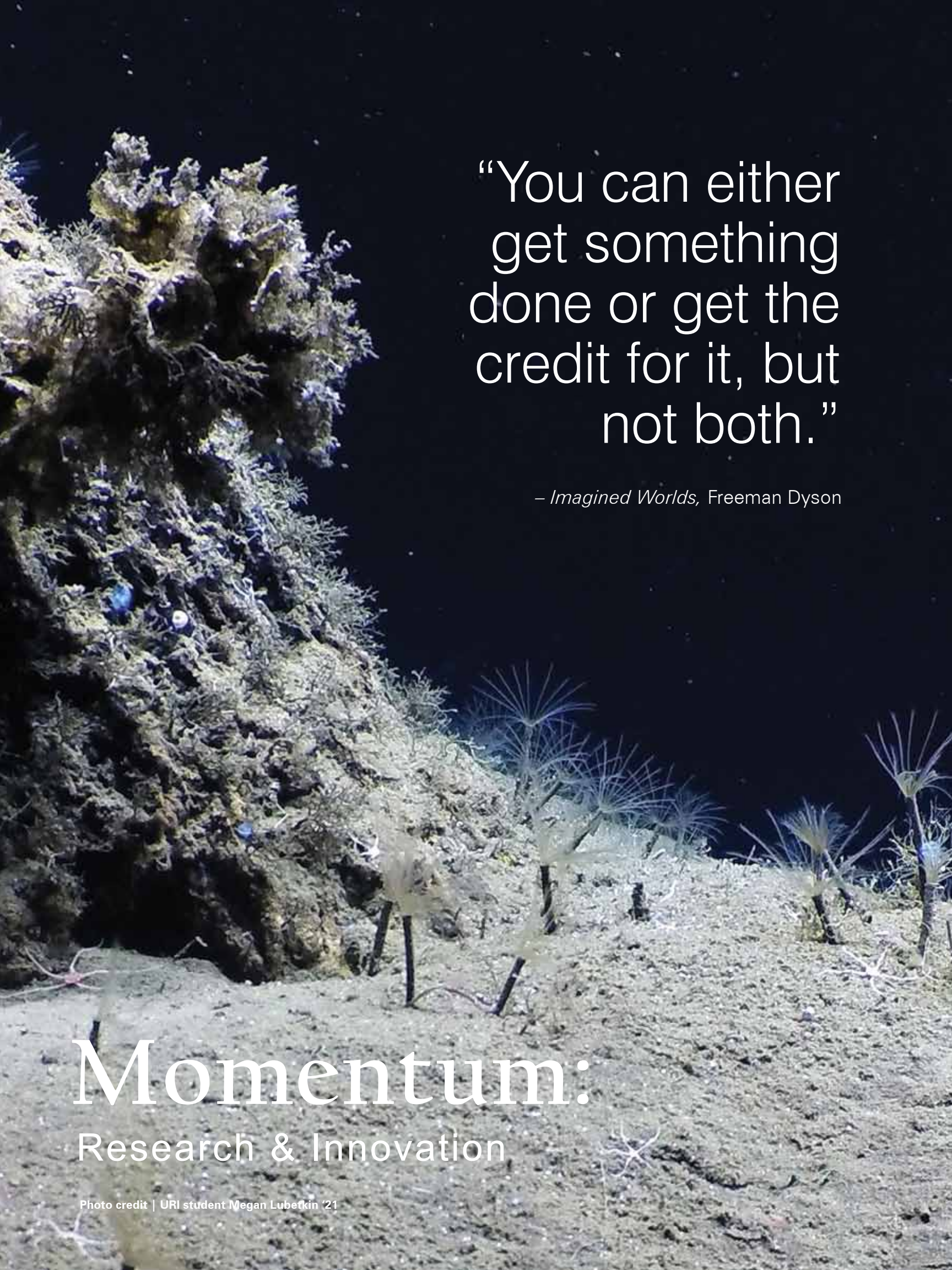
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Momentum

Research & Innovation

SPRING 2019

An underwater photograph showing a large, textured coral structure on the left side, illuminated by a bright light source. The background is dark, and the foreground shows a sandy seabed with several sea urchins and smaller coral fragments.

“You can either
get something
done or get the
credit for it, but
not both.”

– *Imagined Worlds*, Freeman Dyson

Momentum:

Research & Innovation

Photo credit | URI student Megan Lubetkin '21

FROM THE VICE PRESIDENT

A good friend of mine recently suggested a book authored by the British-American theoretical physicist, Professor Freeman Dyson (b. 1923). Dyson, who is now a professor emeritus at the Institute for Advanced Study of Princeton University, is not only one of the most influential physicists of the 20th century, but he also is highly regarded as a “futurist” along the lines of H.G. Wells, Isaac Asimov, Marshall McLuhan and James Lovelock. In 1997, Dyson published a thin book of essays, entitled *Imagined Worlds* (Cambridge, Harvard University Press, Inc.), in which he speculates about the future of science, technology and its impact on human civilization. Although the book was published more than 22 years ago, I would highly recommend it as being both prescient for its time and thought-provoking with respect to our own future path.



In one of his essays for *Imagined Worlds*, Dyson reflects on his experience as a scientist for the Royal Air Force during World War II, and he fondly remembers his chief (that is, his research assistant), Mr. Reuben Smeed. Dyson attributes to his chief the origin of “Smeed’s Rule,” which states that “You can either get something done or get the credit for it, but not both.” That passage stuck with me, and I started to reflect on my own career path – and how my personal success as a scientist has been utterly dependent on the dedication, enthusiasm, creativity and intelligence of my own graduate students, post-doctoral fellows and – perhaps most importantly – several research assistants whom I have been fortunate to have included in my research group over the years. Even more than my students, my research assistants have been the glue that has bound my lab group and work together, particularly during the conduct of complex clinical trials. One or more of these individuals may read this essay and will know that I am referring to them; and they are already aware that I credit my own career success in good measure to their hard work.

Our research assistants, technicians and lab managers are singularly important to the success of any significant research group, regardless of whether the field of study resides within the STEM sciences, in the creative arts (e.g., a props manager for Theatre, or a stage manager for Orchestra), or in the social sciences. In this issue of *Momentum*, we take the opportunity to celebrate and thank the many, many individuals at URI who “get stuff done” in our laboratories, in our studios, on our vessels, in field work internationally, on our stages and in our core facilities. In this article, you will read about some remarkably talented individuals, and we hope you will appreciate that we could only highlight a few as being representative of so many others whom we depend on every day and all over the world. Wherever URI faculty researchers are pushing the boundaries of knowledge and expertise in their respective fields of study, and “getting the credit for it,” we are relying on our partners – whom we tend to develop very long-lasting and close personal and professional relationships with – to allow us to shine.

A handwritten signature in black ink, reading "Peter J. Snyder, Ph.D.".

Peter J. Snyder, Ph.D.

Vice President for Research and Economic Development,
Professor of Biomedical and Pharmaceutical Sciences,
Professor of Art and Art History,
University of Rhode Island

Scholar-in-Residence,
Rhode Island School of Design



RESEARCH HIGHLIGHTS

COLLEGE OF ARTS & SCIENCES



Kathleen Gorman, professor of psychology, and director of the URI Feinstein center for a Hunger Free America received a \$588,489 grant in 2019 for the SNAP Outreach Project from the Rhode Island Department of Human Services. The Center has helped thousands of Rhode Islanders since its inception in 1999. Professor Gorman has received \$10.4 million in external funding since joining URI.



Renee Hobbs, professor, communication studies, and director, Media Education Lab, was awarded the 2018 Neil Postman Award for Career Achievement in Public Intellectual Activity by the Media Ecology Association in recognition of her leadership in developing research and practice in media literacy education in the United States and around the world. She was honored to give the 2018 endowed Walker Ames Lecture at the University of Washington's Graduate School for her work on contemporary propaganda.

COLLEGE OF BUSINESS



Shaw Chen, associate dean and professor of finance, was the recipient of the Northeast Decision Sciences Institute Lifetime Achievement Award. The Decision Sciences Institute provides forums to create, disseminate and use knowledge to improve managerial decision making involving systems and people. It is recognized globally as a scholarly professional association that creates, develops, fosters and knowledge.



Stephen Atlas, associate professor of marketing, was selected as a Professor Institute Scholar for Marketing EDGE in 2018. He and his co-authors were honored with the National Endowment for Financial Education Paper Award for the 2019 American Council on Consumer Interests conference. He was also awarded the 2017 Educator Award from the Northeastern Direct Marketing Association.

COLLEGE OF EDUCATION AND PROFESSIONAL STUDIES



Julie Coiro, associate professor of education, was awarded the first annual Erwin Zolt Digital Literacy Game Changers Award. This \$5,000 award, presented by the International Literacy Association, honors literacy game changers who are making an outstanding and innovative contribution to the use of technology in literacy education. This award was established in memory of Erwin Zolt, who inspired in others a "zest for knowledge."



Deborah L. Mathews, director of the Office of Strategic Initiatives received grants in 2019 totaling \$237,256 from the Rhode Island Department of Human Services to provide essential workforce development and consulting services. Her career total since joining URI in external grant funding is \$6.7 million.

COLLEGE OF THE ENVIRONMENT AND LIFE SCIENCES



Nancy Karraker, associate professor of natural resources science, was awarded a Fulbright U.S. Scholars Fellowship. Her research compared populations of the Southeast Asian box turtle within and outside of a national park, studied their movements, and examined their capacity for dispersing and enhancing germination of seeds of important trees. The information gained from her research will be used to help guide conservation efforts for the species in national parks of Indonesia.



Alan Rothman, research professor, and head of the Laboratory of Viral Immunity and Pathogenesis, and program director, URI/RIH COBRE in infectious diseases immunology, received \$1.3 million for his research grant titled: Flavivirus Infections: Pathogenesis and Prevention from the National Institutes of Health. Rothman has received \$27.5 million in external funding since joining URI.

COLLEGE OF ENGINEERING



Associate Professor of mechanical, industrial and systems engineering **Yi Zheng** received a prestigious \$500,000 National Science Foundation CAREER Award for Investigation of Nanoscale Radiative Heat Transfer to Enhanced Thermal Infrared Energy Conversion and Cooling. His work is to study the enhanced thermal properties of nanostructured materials and their energy applications such as thermo-photovoltaic energy harvesting and energy saving by radiative cooling.



Yan Sun, professor of electrical, computer and biomedical engineering, won the 2018 Premium Award for Best Paper in IET Wireless Sensor Systems, for the paper entitled "Hybrid wireless sensor networks: a reliability, cost and energy-aware approach". She was also elevated to the IEEE Fellow (class 2019), for "contributions to trust modeling and statistical signal processing for cyber-physical security."

COLLEGE OF HEALTH SCIENCES



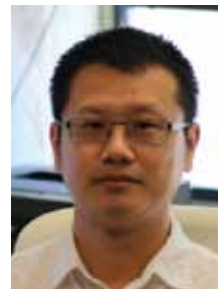
Bryan Blissmer, professor and director of Institute for Integrated Health and Innovation received a \$415,867 for a set of Ryan White Fund projects from the U.S. Department of Health and Human Services. These projects support training and implementation of student-centered teams to help manage the many physical and mental health issues of people living with HIV in Rhode Island. Since joining URI, Blissmer has received \$6.5 million in external funding.



Assistant Professor of Health Studies **Steve Cohen** received the Excellence in Aging and Public Health Rural and Environment Research Award, American Public Health Association, Aging and Public Health Section. The paper is on rural-urban health disparities among older adults. Cohen was the lead author, co-authors on the paper were health studies faculty Associate Professor Molly Greaney and Assistant Professor Natalie Sabik.



Lisa Harlow, professor of psychology, was selected by the American Psychological Association as one of 33 influential psychologists to identify the next big questions psychology needs to answer. Harlow, who is the outgoing editor of *Psychological Methods*, noted that science is currently under scrutiny and considered how we could help build more trust in the findings from researchers' studies. Her suggestions include providing more guidelines to empower researchers to use and present more open, reliable, and reproducible methods that yield interpretations that are theoretically and empirically supported, thus moving science forward.



Matt Wei, assistant professor at the Graduate School of Oceanography, received a National Science Foundation Faculty Early Career Development Program award, a prestigious initiative that supports junior faculty members throughout the country. Wei studies earthquakes beneath the ocean bottom to learn more about earthquakes on land.

COLLEGE OF NURSING



Professor **Mary Sullivan** received funding of \$648,382 for the first year of a five-year \$2.9 million award from the National Institutes of Health for her research project: Allostatic Load and Epigenetic Mechanisms in Life course Trajectories of Premature Infants at Age 30. She has received \$5 million in external grant funding since joining URI.



Debra Erickson-Owens, associate professor of nursing, was named a Fellow in the American Academy of Nursing in recognition of her contributions to improving maternal/child health, including pioneering research in the area of umbilical cord clamping at the time of birth. Erickson-Owens was also named a Fellow of the American College of Nurse Midwives.

COLLEGE OF PHARMACY



Assistant Professor of Pharmacy **Xuerong Wen** received a \$435,491 grant from the National Institutes of Health for her research project Neonatal Neurodevelopment and Maternal Outcomes in Pregnancy with Opioid Exposure. Her research will help determine the impacts of prenatal opioid exposure on mother and infant health and provide evidences for improved prenatal care.

GRADUATE SCHOOL OF OCEANOGRAPHY



Elin Torell, director of International Programs for the Coastal Resources Center, received a Woman of Achievement Award from the YWCA of Rhode Island for her gender equity research on the African continent. Torell has spent two decades researching how women can take on a greater role in fisheries management throughout the world. She received a \$2 million grant from the U.S. Agency for International Development for the USAID Philippines Fish Right project this year, the total amount for the project is \$25 million. Elin also serves as the Deputy Director for the USAID Funded Fish Innovation Lab, which is implemented via a number of research grants in West Africa, East Africa and Asia.



Brian Crawford, senior coastal resources manager at the Coastal Resources Center, and an adjunct faculty in the Department of Marine Affairs, manages the Ghana Sustainable Fisheries Management Project, a \$24 million grant from the U.S. Agency for International Development. The CRC is working with local and international partners to rebuild small pelagic fish stocks in Ghana that are important for local food security. The project also seeks to economically empower women through improvements in the post-harvest value chain and contains a component on combating child labor and trafficking in the artisanal fisheries sector. Crawford has received \$62 million in external grant funding since 1999.

SPECIAL MENTION

The URI Graduate School of Oceanography hockey team, the **Narragansett Bay Blades**, triumphed over its annual adversary, the Woods Hole Oceanographic Institution High Stickers. GSO has the Niskin Cup (pictured right) proudly on display in the Nautilus Galley, Ocean Science and Exploration Center building. The two institutions have been rivals for the cup since 1978.



photo credit: Veronica Berounsky



photo credit: Winifred Nwangwu

Franca Cirelli, assistant director of Sponsored Projects, Pre-Award is the 2018 recipient of the URI Foundation Staff Excellence Award. Franca is the first person since the inception of the URI Research Office to receive this prestigious award. She joined the University of Rhode Island 31 years ago and has been at the heart of the Division of Research and Economic Development for 26 years. She stands out as a resource on campus for her extensive experience and depth of knowledge of the federal and state grant systems, including the ever-changing regulations. She is beloved by faculty and staff for her helpful nature, humor, patience and willingness to go above and beyond to assist researchers meet deadlines and achieve their goals. Franca is known for her love of family, cooking and photography.

WHAT'S INSIDE

THE UNIVERSITY OF RHODE ISLAND
{MOMENTUM: RESEARCH & INNOVATION}



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ENGAGE, EDUCATE, EMPOWER: THE THREE E'S OF TICK DISEASE PREVENTION

"The Tick Guy" Professor Thomas Mather strives to educate people to take appropriate actions in tick prevention behavior. And his work starts at the source – our own backyard – Rhode Island. He and his team are educating the next generation of TickSpotters.



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BUILDING A NETWORK FOR STATEWIDE BIOMEDICAL RESEARCH EXCELLENCE

Funded by the National Institutes of Health with more than \$61 million, the Rhode Island IDeA Network of Biomedical Research Excellence (RI-INBRE) was just awarded another five-year, \$20 million grant to continue the program on grant support and hands-on student training in the research disciplines of cancer, neurosciences and environmental health sciences.



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INCENTIVIZING WHAT YOU EAT FOR HEALTHIER CHOICES

Assistant Professor Maya Vadiveloo aims to create tools to influence healthier dietary habits. She is exploring how marketing techniques broadly used in the retail world could influence the decisions she knows has gravitas – what people eat.



26

THE LIFEBLOOD OF SUCCESSFUL RESEARCH TEAMS

The image of the lone scientist, toiling alone at his or her lab bench, is a romanticized image for cinema — but that is not really how modern science works. These key professional relationships form the core of successful lab groups, and they serve as the glue that bind together, motivate and manage successful teams.



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INCREASING THE DOSAGE OF SCIENCE EDUCATION

The first step in strengthening a science curriculum starts with empowering teachers. As director of GEMS-Net, Assistant Professor Sara Sweetman has worked to ensure that all middle and elementary school teachers in the partnership have the tools, training, and standardized curriculum to teach science education, including the ever-growing field of computer science.



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THINKING BIG ABOUT SMALL THINGS: APPLICATIONS AND IMPLICATIONS OF NANOTECHNOLOGY

Professor Geoffrey Bothun's research on nanoparticles holds potential application in both the medical and environmental fields. His research group is creating and testing nanoparticles that target cells infected by disease and provide necessary medicine for treatment, and also developing materials safe for animals and humans to aid in oil spill dispersion.



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NURSING PROFESSOR SERVING THE DISADVANTAGED POPULATION


Professor Diane Martins is working with vulnerable populations in need of shelter, food assistance and healthcare. She and her colleagues focus on the patients to gain insight and discover ways to better serve the population.



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ACADEMIC SUMMIT 2019: INSPIRING RESEARCH AND SCHOLARSHIP CONVERGENCE AT URI

The 11th Annual Academic Summit delved into how cross-disciplinary and multidisciplinary approaches can inspire solutions to some of the global problems facing the world today such as fake news and microplastics in the oceans.



"Our research assistants, technicians and lab managers are singularly important to the success of any significant research group, regardless of whether the field of study resides within the STEM sciences, in the creative arts or in the social sciences."

- Peter J. Snyder

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ENGAGE, EDUCATE, EMPOWER:

The Three E's of Tick Disease Prevention

WRITTEN BY **BETHANY DELOOF '20**

Professor Thomas Mather, a tick biologist and disease ecologist at the University of Rhode Island (URI) sums up his work's mission with three E's: Engage, educate and empower.

Not only are these three words a mantra for the entirety of Mather's work, they also serve as the building blocks of Mather's tick-prevention research center with an aim to train contentious tick experts and ultimately protect people from the various diseases that ticks transmit.

Perhaps you've heard that ticks die in the winter, or maybe you believe ticks drop out of trees onto your head. Mather is confident everybody knows something about ticks. However, he's equally confident that a lot of what people know is often "just wrong enough" to leave them at increased risk for disease.

"What would you do if you thought ticks dropped out of trees onto your head?" Mather asks. "You'd put protection on your head, and you would miss all the tiny ticks that were

crawling up your legs. And if ticks died in the winter, where would next year's ticks come from?"

Mather strives to improve public understanding and, thereby, to encourage us to take appropriate actions to protect ourselves from ticks. His work started at the source: people's backyards, where he conducted workshops in high-risk neighborhoods and allowed people to learn about ticks in a familiar place.

"We felt people just needed to know more about ticks and become comfortable that they could still live and enjoy the outdoors even if there were ticks there, and where better to make them comfortable than in their own backyards?" says Mather.

Although the workshops were popular and even fun, there was a missing element. Family members and friends who couldn't come to the workshops wanted a brochure or a website, but at the time Mather had neither.

Mather seeks to provide people with the necessary armor against ticks in the form of a broad-spectrum vaccine.



Once full of blood, a female blacklegged tick can lay 1,500-3,000 eggs to start the tick life-cycle anew.



Tick warning notices, URI's TickGuy knows there are ticks in more places and wants you to know, too.

HIS WORK STARTED
AT THE SOURCE:
people's backyards,
where he conducted
workshops in high-
risk neighborhoods
and allowed people to
learn about ticks in a
familiar place.

Mather started researching ticks at URI in 1992 and was able to work in his own backyard — all over the state of Rhode Island.


He now has a large-scale website, TickEncounter, that just last July was responsible for 15 percent of the entire web traffic to the University as one of more than 400 websites on URI's web server. TickEncounter is a portal to tick expertise, as Mather describes the site, where people can conveniently find information they need exactly when they need it.

Mather is particularly proud of one component of TickEncounter — a citizen-science project he calls TickSpotters, which enables people to submit photos of ticks they find, fill out a survey about the tick, and further share their experience in a comments box. The site has received more than 60,000 submissions. The next step for TickSpotters is to expand the program further and to receive data in a more accessible and collaborative form using a cloud-based customer relations management system, customized by NeuraFlash.

Mather focuses on what he refers to as people's lived experiences with ticks, and he believes this concept is the key to tick disease prevention. Mather describes a lived experience as the conditions under which a person encounters a tick, for example, while walking a dog, and he explains that lived experiences are partially unique to an individual while sharing some commonalities with others. By looking at people's lived experiences, Mather can relate to them and better understand how to help protect them from tick-borne illnesses.



Mather's team works with ticks in their URI lab to identify a new type of vaccine to interrupt transmission of any tick-transmitted germ.



He now has a large-scale website, TickEncounter, that just last July was responsible for 15 percent of the entire web traffic to the University.

URI.EDU/TICKS

Mather's goal for the future is to train more tick biologists like himself, scientists who also have a passion for elevating the tick literacy of non-scientists. While he acknowledges that there are many great tick biologists seeking preventative measures, he believes his work goes further as he connects with people and builds their trust.

"As we train the next generation of tick experts, we need to be sure they have specific training on this lived experience concept," says Mather. "We don't need everyone in the lab pipetting stuff to make a magic bullet. We have a lot of people doing that. What these next-gen tick experts need to know is how to relate to people in their backyards."

DESPITE PREVENTION EFFORTS, HOWEVER, THERE ALWAYS REMAINS THE RISK OF BEING EXPOSED TO THE PATHOGENS TRANSMITTED BY TICKS, AND WITH INCREASING TICK POPULATIONS GLOBALLY, MATHER'S PROTECTION EFFORTS ARE EVEN MORE IMPORTANT.

Mather seeks to provide people with the necessary armor against ticks in the form of a broad-spectrum vaccine. Vaccines for Lyme disease that have been developed are effective for dogs yet are not available for people. However, ticks such as blacklegged ticks, the species that transmits Lyme, also are responsible for transmitting multiple other diseases. Therefore, even if there was a Lyme disease vaccination, it would leave people vulnerable to contracting other diseases such as babesiosis, anaplasmosis and more.

Ticks have components in their saliva, such as painkillers and anticoagulants that prevent the clotting of blood, and that they inject into the bite site to prevent being rejected by the host. Some of the proteins found in tick saliva are recognized by humans as foreign, resulting in an acquired immune response after being bitten by a tick.

Mather, in work sponsored by the National Institutes of Health (NIH), and now globally through a project with the Technische Universität Braunschweig, in Germany, wants to make everyone's immune systems immediately recognize these tick saliva components as foreign and generate an immune response when next exposed to the bite of a tick. He believes that the immune response specific to the tick proteins will provide a broader degree of protection against the germs coming out in the tick saliva.

Another program Mather's team is working on, sponsored by the National Institutes of Occupational Safety and Health, involves assessing the effectiveness and safety of wearing long-lasting permethrin-treated clothing – clothing with an insecticide built in – to repel disease carrying ticks.

Professor Thomas Mather and Research Assistant Steven Engbord sweep a brushy edge in search of host-seeking ticks.

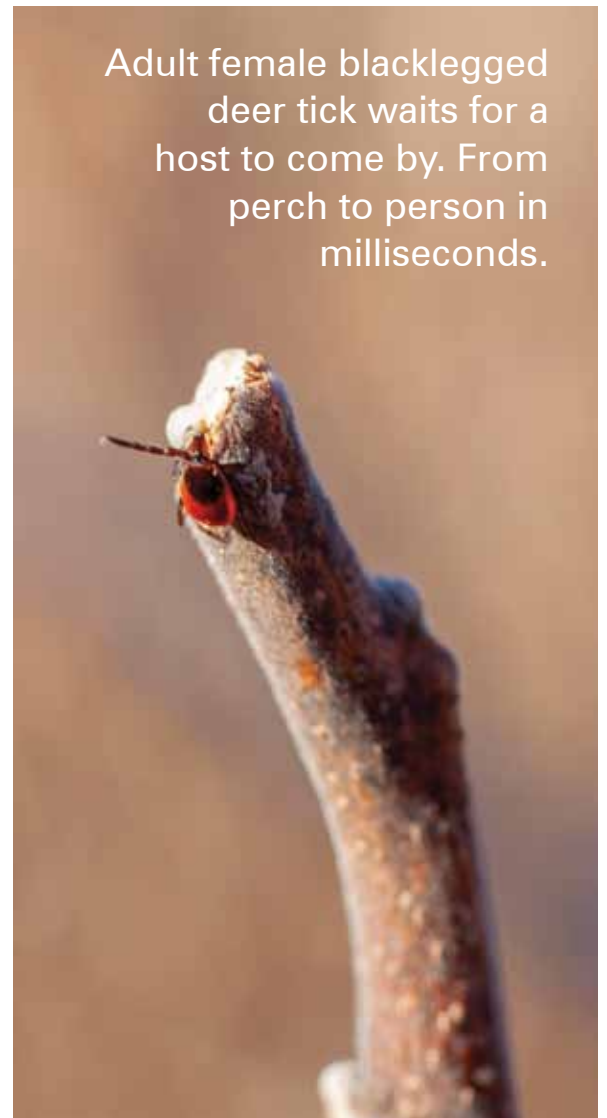


THOMAS MATHER
Professor
Entomology



Professor Tom Mather holds a female blacklegged tick at arm's length with tweezers.

Adult female blacklegged deer tick waits for a host to come by. From perch to person in milliseconds.



Mather strives to improve public understanding and, thereby, to encourage us to take appropriate actions to protect ourselves from ticks.





HEATHER KOPSCO '19

Ph.D. Candidate, Department of Plant Sciences and Entomology

Heather Kopsco's passion for science comes from her own experience with tick-borne illness, and a desire to challenge herself led her to pursue a master's degree in ecology, studying the transmission of Lyme disease bacteria among migratory birds. URI is the perfect place for her doctoral research, Professor Thomas Mather is known as "The Tick Guy."

"He proposed looking at tick-borne disease from the health communications standpoint. I'm sort of out my wheelhouse here, as an ecologist, asking public health communication questions," she says. "But this exercise in interdisciplinary study is incredibly important to understand how to better communicate science overall."

Kopsco, who is pursuing her Ph.D. in biological and environmental sciences, plays an essential role in Mather's TickSpotters operation that identifies ticks in photos people submit. The operation aims to assess the risk of the tick to the individual and help people prevent future encounters with ticks. Kopsco also evaluates the effectiveness of the program as an education tool for people to learn about ticks, and to determine if it is a cost effective and efficient way of tracking ticks. She looks at how data received from TickSpotters corresponds to areas of known tick populations or the detection of new tick outbreaks.

"Can we use this digital surveillance as a proxy for humans out collecting ticks, and is it a more precise way to detect ticks across the country because you're getting greater coverage and a broader picture of what's going on?" she says of her research.

Kopsco, encouraged by teamwork, works alongside researchers from various disciplines including communications, statistics, public health and entomology.

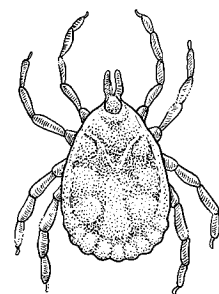
"What I've observed at URI is an eagerness to collaborate and it's been really inspiring," she says. "I think it's awesome that people are willing to cross into other disciplines and be exposed to something they're not fully comfortable with to help someone answer complex questions."



Can you spot the tick
on this dog's nose?

Pets are also affected by tick bites and tickborne germs. People should check their pets and themselves after being outdoors.

The operation aims to assess the risk of the tick to the individual and help people prevent future encounters with ticks.



Whether he's engaged in people's backyard improving education efforts, or providing the necessary tools, resources, and knowledge to guard against ticks, Mather's main goal is to help people by empowering them to grow from being "just wrong enough" thinkers to "just right enough."

"My wife sees me on the computer answering one email after another from the thousands of TickSpotters submissions coming in from all over North America, and she says, 'Well, you're saving people one at a time,'" says Mather. "I know it doesn't seem very scalable, because we're facing more ticks in more locations around the world. But I truly believe that what I'm doing and what we're building is the right thing to do."



Building a Network for Statewide **BIOMEDICAL RESEARCH EXCELLENCE**

written by **TODD MCLEISH**



The RI-INBRE Core Facility Laboratory.

“RI-INBRE WAS JUST AWARDED A FIVE-YEAR, \$20 MILLION GRANT TO CONTINUE THE PROGRAM IN THE RESEARCH DISCIPLINES OF CANCER, NEUROSCIENCES, AND ENVIRONMENTAL HEALTH SCIENCES.”

- BONGSUP CHO



The Ocean State stands on the cusp of becoming a major player in biomedical research, thanks largely to a network of researchers and a student training program established as part of the Rhode Island IDeA Network of Biomedical Research Excellence (RI-INBRE).

Funded by the National Institutes of Health with more than \$61 million since its inception in 2001, the network was just awarded a five-year, \$20 million grant to continue the program in the research disciplines of cancer, neurosciences, and environmental health sciences.

Based at the University of Rhode Island's (URI) College of Pharmacy — in partnership with Brown University, Bryant University, Community College of Rhode Island, Providence College, Rhode Island College, Roger Williams University and Salve Regina University — the program is building research capacity by supporting and mentoring early-career faculty development, providing experiential learning opportunities to students, and acquiring and maintaining high-tech equipment for use by all participating researchers.

"Our job is to make sure that junior faculty around the state have the basic biomedical research infrastructure available, so they can train the next generation of biomedical scientists and create a pipeline to fill the needs of the

state's biomedical sector," says Bongsup Cho, the URI professor of pharmacy who leads the program. "Science is expensive these days, so RI-INBRE is the mechanism to help researchers at all the institutions be competitive. And the results have been very impactful."

In the program's first 18 years, RI-INBRE has supported more than 500 research and training projects involving 151 different faculty members. RI-INBRE also has provided research training to 1,413 undergraduate students, 171 graduate students and 49 postdoctoral fellows. As a result of these efforts, faculty supported by the program have been awarded an additional \$72 million in external grants to continue their independent research.

"Many of the junior faculty we've supported through the years have gone on to be promoted to full professors, and now they're serving as mentors and scientific consultants in the program," Cho says. "We've built a real community of biomedical researchers in Rhode Island. People at the various colleges who didn't know each other before are now collaborating on their research."

The establishment of a centralized core research facility on the URI Kingston Campus in 2003 delivered a significant

boost to the state's biomedical research efforts by providing state-of-the-art scientific instrumentation that can be used by all RI-INBRE supported faculty members and their students. The only facility of its kind in Rhode Island, the laboratory features equipment for mass spectrometry, microscopy and imaging, cell culturing, chromatography, flow cytometry and more.

"We receive a wish list of instruments and purchase the big-ticket items that most investigators can't afford to purchase for their own labs," explains Cho. "We're buying new machines all the time and consistently upgrading our equipment."

One of RI-INBRE's most effective initiatives has been the Rhode Island Summer Undergraduate Research Fellowship (SURF) program, which provides students with 10-week research fellowships to gain hands-on experience conducting biomedical research. The summer work culminates with an annual conference that affords the fellows the occasion to present their scientific findings to a group of peers and mentors. The largest conference of its kind in New England, the event has grown significantly through the years and wields tremendous influence on the career trajectory of many of the participating students.

Dioscaris Garcia was one of the first fellows. He worked with URI Pharmacy Professor David Rowley in 2004, culturing marine bacteria to identify those with



"The RI-INBRE program has been truly transformative for Rhode Island. We've built a real community of biomedical researchers in RI."

- Bongsup Cho

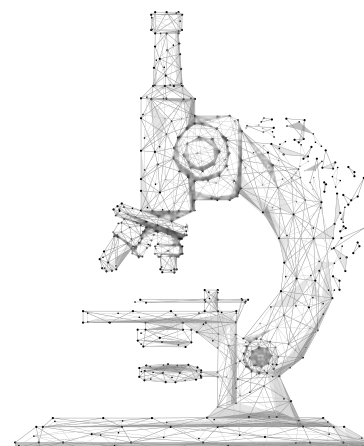


Photo credit | URI student Rose Jacobson '21

RI-INBRE has supported more than **500** research and training projects involving **151** different faculty members.

RI-INBRE also has provided research training to **1,413** undergraduate students, **171** graduate students and **49** postdoctoral fellows.

As a result of these efforts, faculty supported by the program have been awarded an additional **\$72** million in external grants to continue their independent research.



A portrait of Bongsup Cho, a middle-aged man with glasses, wearing a dark blue blazer over a light blue button-down shirt. He is standing in front of a background of horizontal white slats, possibly a window blind or a modern architectural feature. The lighting is soft and even.

One of RI-INBRE's most effective initiatives has been the Rhode Island Summer Undergraduate Research Fellowship (SURF) program, which provides students with 10-week research fellowships to gain hands-on experience conducting biomedical research.

BONGSUP CHO

Professor
Pharmacy
Director, RI-INBRE

secondary bioactive metabolites with antimicrobial activity. Garcia calls the project the "single most influential experience" of his young scientific career.

"This experience fostered a sense of community and collaboration the likes of which I had never experienced before," Garcia reflects. "As an inner-city youth with little exposure to the possibilities and options STEM had to offer, the SURF program gave me the push to explore passions I didn't know I had."

As a result of his participation in the program, Garcia went on to earn a doctorate at Brown University in molecular pharmacology and physiology, which led to his present job as assistant research professor and co-director of Brown's Weiss Center for Orthopedic Trauma Research.

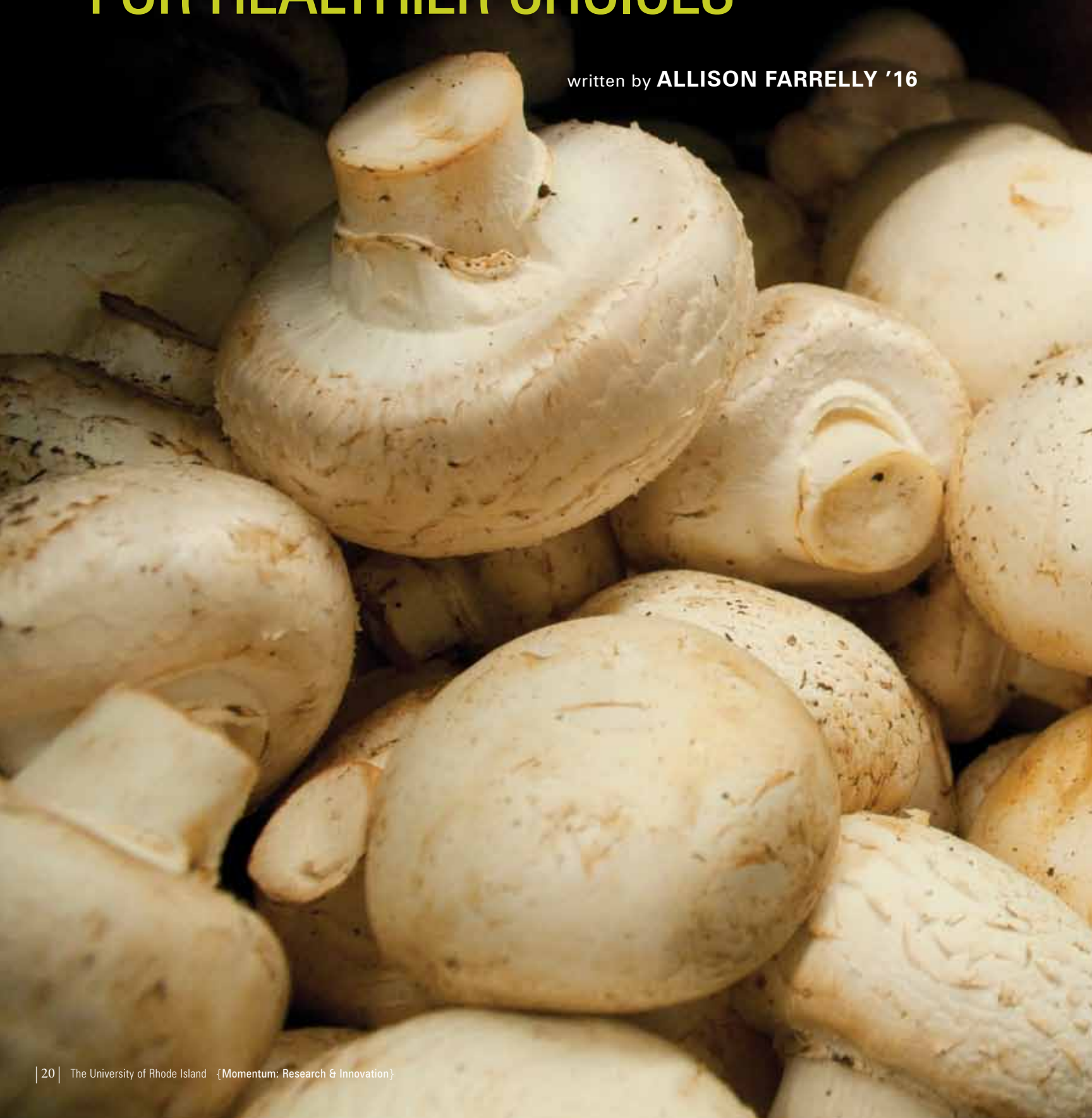
The new RI-INBRE funding cycle establishes post-baccalaureate positions to encourage outstanding students to remain in Rhode Island. To support former SURF students enrolling in graduate school new teaching assistantships are being created. Additionally, the new grant will help improve the teaching postdoctoral fellowship program and launch community engagement activities which will promote collaborations with other research program grants in the state.

"The RI-INBRE program has been truly transformative for Rhode Island," concludes Cho. "We've contributed to faculty success, trained hundreds of students who are now out in the workforce or earning advanced degrees in biomedical science, and we've inspired a culture change among researchers, especially at the primarily-undergraduate institutions. And we're not finished yet."


INCENTIVIZING

WHAT YOU EAT FOR HEALTHIER CHOICES

written by **ALLISON FARRELLY '16**







Of the 10 causes of death and disability identified by the Centers for Disease Control, seven are influenced by everyday human behavior: Diet.

Maya Vadiveloo, University of Rhode Island (URI) assistant professor of nutrition and food science, aims to create tools to influence healthier dietary habits. She is exploring how marketing techniques broadly used in the retail world could influence the decisions she knows has gravitas – what people eat.

“Regardless of who you are, everyone has to eat,” Vadiveloo says.

Retail industries widely use targeted marketing as a tactic to draw consumers. Toothpaste coupons frequently follow the purchase of a new toothbrush, a Google search for new running sneakers prompts ads on social media, and even browsing in a local retail store can trigger corresponding banner ads on search engines.

Comparatively, in the nutrition field personalized advertising remains in its infancy. Vadiveloo thinks this represents a missed opportunity.

She is collaborating with Belmont Market, a family-owned grocery store in Wakefield, Rhode Island, to test whether targeting incentives improve consumers shopping decisions in the grocery store. From September 2018 through May 2019, Belmont will be distributing highly personalized coupons to 224 customers, discounting healthier alternatives to items they currently buy. The team of collaborators and mentors includes URI College of Business Professor Stephen Atlas, and URI College of Pharmacy Assistant Professor Ashley Buchanan, as well as numerous graduate students and undergraduate students. Vadiveloo also partners with Dr. Anne Thorndike an associate physician at Massachusetts General Hospital and an assistant professor at Harvard Medical School, whose research interests are in the prevention and treatment of obesity through lifestyle modification and behavioral-economics informed interventions.

“Regardless of who you are, everyone has to eat.”

- Maya Vadiveloo



MAYA VADIVELOO

Assistant professor
Nutrition and food science

Current initiatives aimed at influencing diet quality often lean on discounting fruits and vegetables.

"In reality, not all people need to eat more fruits and vegetables," Vadiveloo says. "Some people do really well with that but could make a subtle shift in other areas."

With her method of marketing, a consumer who buys refined grain or white bread could receive a discount for a whole grain alternative, and someone who buys yogurt could be pushed coupons for an option with less sugar.

In total, Vadiveloo and her team have created more than 100 coupons discounting items such as low-fat dairy products, salmon, lean cuts of beef, chicken, whole grain breads, and dairy-free alternatives, among many others.

Setting up the framework for the pilot took the research team the better part of a year, a process Vadiveloo knows will need to be refined before the program can scale. The first step was to hand-code the UPC codes — unique product barcodes — that registers collect from each purchase. Once each food item was coded, the research





Belmont Marketing Director Susan Hoopes, AgroParis Tech graduate student Elie Perraud, URI Professor Vadiveloo, URI Ph.D. students Xintong (Cynthia) Guan and Haley Parker.

team developed an algorithm that deploys personalized coupons based on each customer's unique purchasing behavior.

The project also involved surveying the participants to understand of the quality of their diet and their diet preferences.

"For someone with a vegan diet, it doesn't really matter if fatty fish would improve their diet quality, they're not going to buy that fish," Vadiveloo explains.

During the summer and early fall of 2018, in addition to food preferences, the team collected information on education level, household income, body weight and health goals.

"My hope is that this is a proof of concept level analysis," she says. "I want to show that giving people specific coupons that are relevant to them, and not to a general population, can improve what they purchase."

"I want to show that giving people specific coupons that are relevant to them, and not to a general population, can improve what they purchase."

- Maya Vadiveloo

Her research currently is being funded by a \$300,000 Foundation for Food and Agricultural research grant, which the University matched. If the program meets with success, Vadiveloo hopes to develop the program into a model that can be used by public health advocates to influence diet quality. To that end, Vadiveloo is applying for a career development award to expand her coding skills so she can help tackle the big data side of the project.

Although the project is a pilot, she already sees a multitude of ways that partnering with grocery stores could help nutritionists positively influence diet quality. Throughout her career, Vadiveloo has found one of the major sticking points in her diet research lies in a lack of reliable data, a problem she thinks food purchasing data could help remedy.

"One of the big criticisms in nutrition is that our understanding of people's diets is based on what people tell us," says Vadiveloo. "Self-reporting past food consumption can be tedious and unintentionally misleading. People may be likely to tell you they eat less in food groups they wish they ate less often, or overreport other categories."

Through a \$25,000 grant from the Rhode Island Foundation, Vadiveloo and her students are examining self-reported food consumption data and comparing how diet quality predicts diabetes and disease preferences at the state level. Food purchasing data, however, could present a more accurate and objective mirror of a person's diet quality and help predict and prevent disease.

"I think it's an interesting problem to tackle because it has a huge impact on people's lives, it affects everybody," she says. "There are a lot of complex reasons why we eat the way we do, and I find complex problems interesting."

Vadiveloo finds URI the perfect place to tackle complex problems: "When URI talks about interdisciplinary work, it's not just lip service. They've worked hard to foster and support research across disciplines."

Vadiveloo also collaborates with professors and their students in marketing, and computer science and analytics to help with the development of the algorithm. She works with faculty in the URI Department of Plant Sciences on the role of food environments on diet and diet quality. Her graduate students collaborate with professors in the URI Department of Human Development and Family for maternal and infant nutritional health research.

"The collaborative framework is important for scientific advancement and the way I work best. I think advancements from any field have to come from outside our silos," says Vadiveloo.



"One of the big criticisms in nutrition is that our understanding of people's diets is based on what people tell us."

- Maya Vadiveloo

THE LIFEBLOOD OF SUCCESSFUL RESEARCH TEAMS

“The image of the lone scientist, toiling alone at his or her lab bench, is a romanticized image for cinema — but that is not really how modern science works.”

- Peter J. Snyder

written by **TODD MCLEISH**

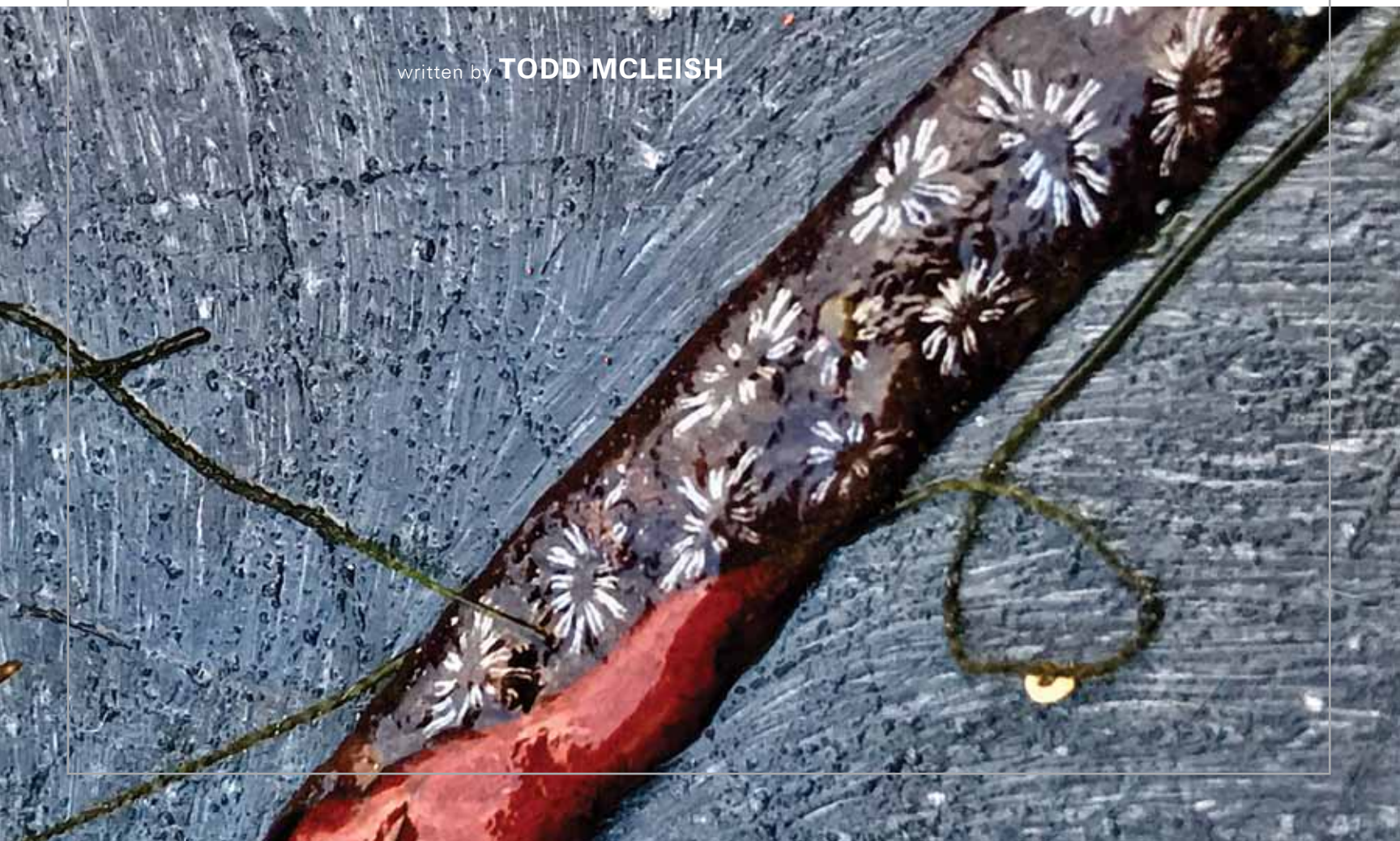


Photo credit: URI student Emma Ferrante '19

Among the thousands of people involved in complex research and scholarship at the University of Rhode Island (URI) at any given time, it's the approximately 300 faculty members designated as principal investigators on major research grants who get most of the attention. And appropriately so, for they are the scholars who are asking the innovative questions to advance their respective fields, and they are personally responsible for managing oftentimes expensive and complex laboratory-based programs.

Nonetheless, most of those same faculty members readily acknowledge that they serve as the leaders for what is actually a “team sport.” Most principal investigators (PI's) could not manage their own programs without relying on various combinations of lab managers, research assistants, technical support staff, post-doctoral fellows, graduate assistants, undergraduate students and many university support and administrative staff who play vital roles in the day-to-day operations of our major research programs.

It is also often the case that PI's form long-lasting professional relationships with one or two key staff, leading to enduring and productive partnerships. These key relationships, that form the basis for highly successful laboratory teams, deserve to be recognized.

“The image of the lone scientist, toiling alone at his or her lab bench, is a romanticized image for cinema — but that is not really how modern science works. The most productive labs and investigators, I've found, are individuals who form lasting relationships with one or two key research staff members. These relationships are built on longstanding trust, shared work styles and expectations, and on a shared passion for their work together,” says Peter J. Snyder, URI vice president for research and economic development, who is also a professor leading his own research group. “These key professional relationships form the core of successful lab groups, and they serve as the glue that bind together, motivate and manage successful teams.”

It is also the nature of scientific research and the lifecycle of research careers that, as faculty mature into the roles of senior investigators, the time that they personally spend in the lab typically diminishes. As their careers mature, PI's spend increasing amounts of time preparing new grant applications to fund their research programs, traveling and lecturing at conferences, writing or editing articles, reviewing others grants and manuscripts, and providing service on various university, governmental and professional organization committees. As a result, PI's become increasingly reliant on their trusted staff to manage their labs, to conduct experiments and to supervise student research activities.

"These people are seldom in the spotlight — they're not giving talks at international conferences, they are not invited to give guest lectures, and they are not speaking in

front of donors or testifying before the legislature," Snyder adds. "But without their dedication and commitment, our research goals, aspirations and productivity would grind to a halt and our institutional research mission would be untenable."

In this article, we want to allow our readers a peek into how important these collaborative relationships are to the success of our research-oriented faculty. Unfortunately, it is impossible to identify all such critically important relationships that have been nurtured, often over decades of time, throughout our colleges and institutes. Rather, the following six profiles are intended to be illustrative, and we celebrate both these talented persons as well as the many more such staff whom they represent. They are all integral contributors to the success of our faculty and students.

The following six profiles are intended to be illustrative, and we celebrate both these talented persons as well as the many more such staff whom they represent.

IRENE ANDREU

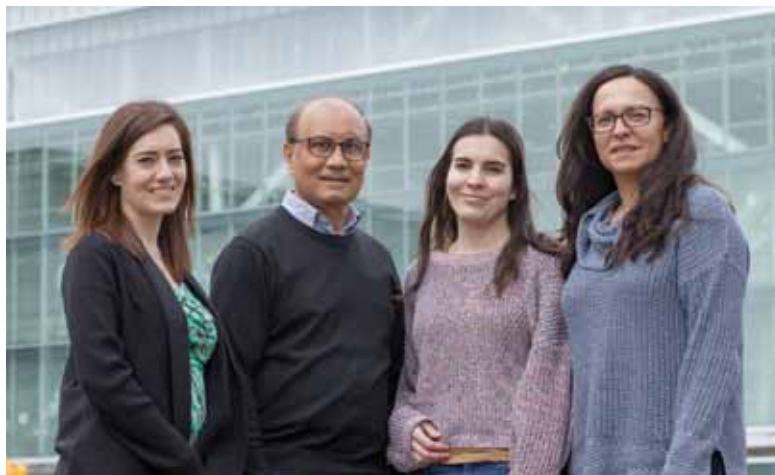
DIRECTOR OF OPERATIONS, RHODE ISLAND CONSORTIUM FOR NANOSCIENCE AND NANOTECHNOLOGY

Not long after arriving on campus last June, Irene Andreu made an impact on the Rhode Island Consortium for Nanoscience and Nanotechnology. Based in the Department of Chemical Engineering, the facility contains numerous high-tech instruments for imaging samples at nanoscales — including a field emission scanning electron microscope, a transmission electron microscope, an X-ray diffraction system, a confocal Raman microscope, and a high-throughput confocal light microscope.

As the director of operations, Andreu supports complex research projects on a wide variety of subjects, from the development of advanced lithium ion batteries to oil-eating bacteria in the oceans.

"We have about 50 faculty from URI and Brown University — and even more students — who use the equipment, and they all look to Irene as the focal point in everything they need to do in the nano-imaging area," says Arijit Bose, distinguished professor of chemical engineering and the scientific director of the Consortium. "She'll train people in the use of the equipment, run samples, advise them on which instrument is best to use for their research, and even help them interpret the images."

And importantly, she makes sure the equipment is up and running at all times.



URI graduate student Dounia Elkhatib, URI Professor Arijit Bose, Director Irene Andreu, URI Associate Professor Vinka Craver.

"The instruments are finicky," Bose adds. "They've got mechanical parts, electronic parts, chillers to keep them cool, and one little thing can make them go offline. It requires an understanding of the instruments inside and out."

In addition, Andreu has taken on the responsibility of writing proposals to fund the lab and acquire additional instruments.

"She's critically important to the state's nanotechnology research," Bose concludes. "Irene is doing the job of two or three people."

"She's critically important to the state's nanotechnology research. Irene is doing the job of two or three people."

– Arijit Bose



DAVID PALAZZETTI

DIRECTOR OF FACILITIES AND OPERATIONS, URI NARRAGANSETT BAY CAMPUS

As the director of facilities and operations at the University's Narragansett Bay Campus, David Palazzetti has the broad responsibility of ensuring that the campus runs smoothly and efficiently. A significant portion of that responsibility requires that he cater to the needs of the oceanographic research faculty.

He chairs the campus Space Committee, for instance, which ensures that faculty — especially new personnel — have laboratory space designed for their particular research needs. He identifies suitable space, oversees its design and renovation, and finds the funding to complete the work.

"It's a role that is greatly appreciated by the faculty," says Bruce Corliss, dean of the Graduate School of Oceanography. "He has the ability to work very effectively across the Bay Campus, whether the need is for heating and air conditioning, minus 80-degree freezers, or fine-tuning labs as they are needed."

Palazzetti, a retired Coast Guard commander and engineer, also oversees ship operations, ensuring that scientists who use the ship have the technical support and shore-based support they need to complete their research at sea. And his role in the development of the campus master plan includes working closely with faculty to ensure their needs for research facilities — and the cutting-edge technology that goes with it — are met when new buildings are constructed.

"Dave plays a critical role in the present and future ship operations and the master plans, and he'll be the point person for construction going forward," Corliss says. "And most of that work is about supporting the research endeavor of the faculty, staff and students."

KATHRYN MEIER

ASSOCIATE DIRECTOR, INSTITUTE FOR INTEGRATED HEALTH AND INNOVATION

Without Kathryn Meier, few major grants would be submitted by faculty at the Institute for Integrative Health and Innovation in the College of Health Sciences, and even fewer would be funded. As the Institute's associate director, Meier serves as the liaison between faculty members writing research proposals and the University's Office of Sponsored Projects.

"She meets with faculty and helps them understand the grant application process, helps them develop a realistic budget, and guides them through to the completion of the proposal so they can focus on the science," says Bryan Blissmer, director of the Institute and a professor of kinesiology. "She especially excels at working with newer faculty who need assistance understanding the URI system."

In the two years since the Institute was established, Meier has facilitated the submission of more than 100 research proposals on such diverse topics as nutrition education at the state prisons, childhood obesity, home-based primary care, substance abuse prevention, caregiving to Alzheimer's patients, and post-traumatic stress disorder. And since most research projects at the Institute involve interdisciplinary research, she helps identify potential members of the research team.

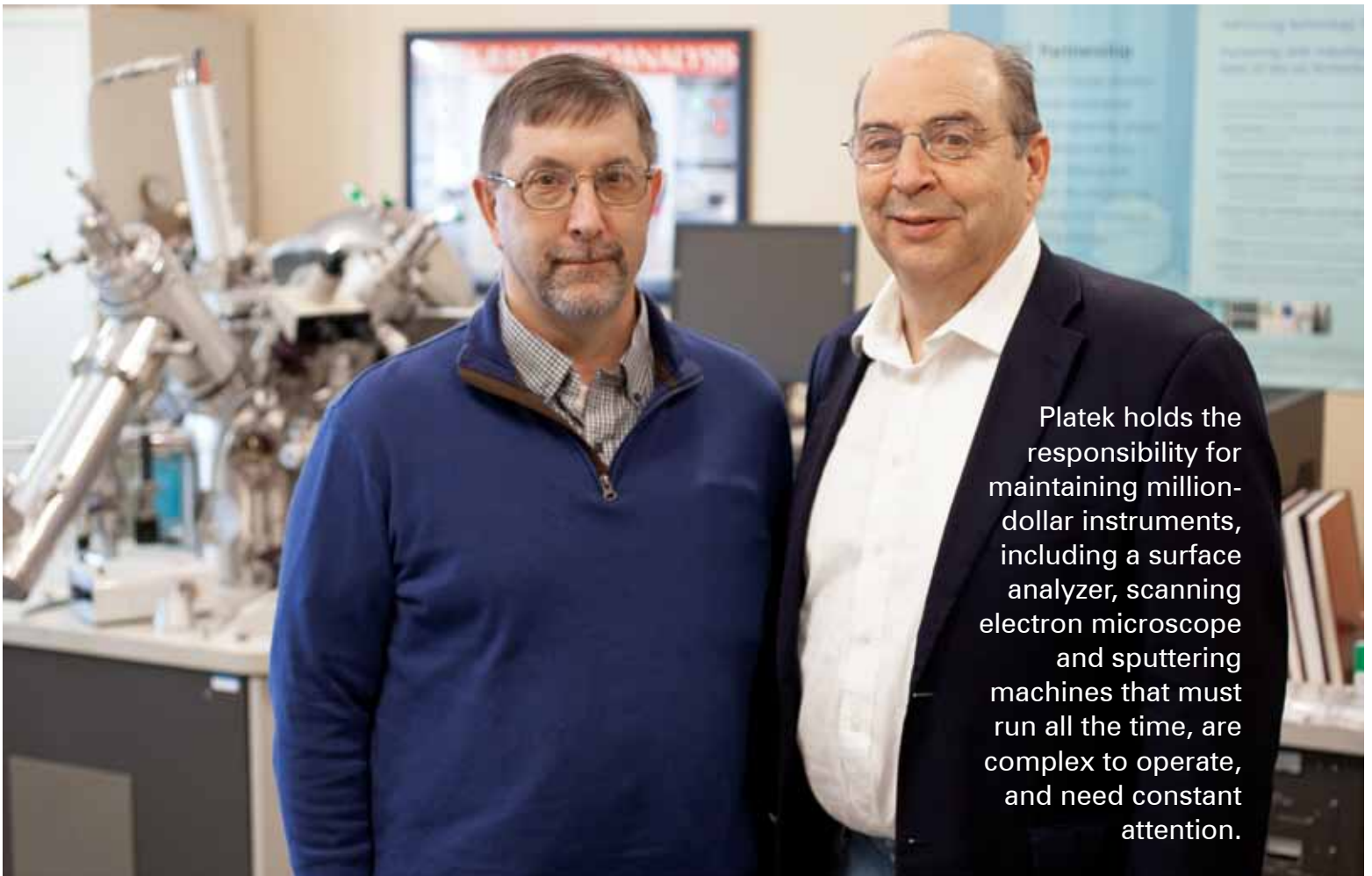
"She understands the landscape of URI faculty members and can make the necessary connections. If you need someone who works on pain or stroke or you need a biostatistician, she can help assemble that team," Blissmer says. "Kathy is an integral piece of our research activity. She smooths the path for so many investigators, reducing their frustration and encouraging them to keep applying for grants."

"Kathy is an integral piece of our research activity."

– Bryan Blissmer



Professor and IIHI Director Bryan Blissmer, Associate Director Kathryn Meier, SWPT Tracey Barton, SRGA Terri-Lyn Hodson and Coordinator Megan Garrison Lane.



Platek holds the responsibility for maintaining million-dollar instruments, including a surface analyzer, scanning electron microscope and sputtering machines that must run all the time, are complex to operate, and need constant attention.

Electrical Materials Engineer Michael Platek and Professor Otto Gregory.

MICHAEL PLATEK

ELECTRICAL MATERIALS ENGINEER, SENSORS AND SURFACE TECHNOLOGY PARTNERSHIP

Professor Otto Gregory is working to create sensors to detect explosives for the Department of Homeland Security, sensors to detect degrading parts in the hottest sections of jet engines, and sensors that the Department of Defense hopes will allow drones to fly into difficult environments to sniff out whether the area contains dangerous materials, among many other projects. None of these activities could succeed without the critical help of Michael Platek.

An electrical materials engineer in the URI Department of Electrical, Computer and Biomedical Engineering, Platek also serves as the laboratory manager for the College of Engineering's Sensors and Surface Technology Partnership, which Gregory directs. Platek holds the responsibility for maintaining million-dollar instruments, including a surface analyzer, scanning electron microscope and sputtering machines that must run all the time, are complex to operate, and need constant attention.

"Mike also runs the analyses, trains students on the use of the equipment, oversees student projects, and he's on every research team I have. "

- Otto Gregory

"Mike wears many hats," says Gregory, distinguished professor of chemical engineering. "We can't afford a service contract for the equipment, and that means that if something goes wrong with them, he fixes it. But Mike also runs the analyses, trains students on the use of the equipment, oversees student projects, and he's on every research team I have."

Platek does similar work for outside companies who pay to use the equipment for their own research programs, ensuring that the cost center operates efficiently and effectively.

"My research couldn't happen without Mike," concludes Gregory. "He's sometimes a co-author on papers, sometimes a co-inventor on my patents, and he's always a critical member of my research team. He does it all."



URI undergraduate students Noah Burke, Jared Weigler, Gregory, Alyssa Kelly, Platek, and Peter Ricci.



Assistant Professor Research and Bioinformatics Core Director Christopher Hemme, Program Assistant Laura Arrighi, Associate Professor and Program Coordinator Niall G. Howlett, Research Associate Kim Andrews, Professor and Training Core Coordinator Brenton DeBoef, Professor and Program Director Bongsup Cho, Business Manager Laura Bellavia, Assistant Professor Research and Centralized Research Core Facility Director Al Bach.

LAURA ARRIGHI

OUTREACH SPECIALIST, RI-INBRE

The Rhode Island IDeA Network for Biomedical Research Excellence (RI-INBRE) was recently renewed with a grant for \$20 million and has been funded with more than \$61 million in the last 18 years to establish a network of researchers and core laboratories in order to build biomedical research capacity around the state. Running the grant demands a complex undertaking that involves hundreds of researchers at seven colleges and universities in Rhode Island, numerous events requiring complex logistical arrangements to keep all parties informed, and a student internship program involving up to 100 students each year.

Laura Arrighi touches every aspect of RI-INBRE's activities. As the network's program assistant, she works behind the scenes preparing documents, scheduling programs and meetings, running the office, overseeing

preparation of the newsletter, revamping the website, and just about every other activity that requires precise attention to detail.

"She's involved in every aspect of the RI-INBRE program," says Bongsup Cho, professor of pharmacy and director of RI-INBRE. "She's absolutely vital. Whenever there's a major program or conference that takes place, there is always someone who has to take care of all of the details. That's Laura."

Equally important is Arrighi's role in coordinating the Summer Undergraduate Research Fellowship (SURF) program, which involves the monumental task of pairing more than 100 students and faculty members from each institution for the 10-week summer research projects, several organizational meetings, and in a culminating conference that often features attendance by the Rhode Island Governor and other local legislators, as well as university administrators and business executives.

"With Laura in charge, it's always a success," Cho says.

"She's absolutely vital. Whenever there's a major program or conference that takes place, there is always someone who has to take care of all of the details. That's Laura."

- Bongsup Cho





“He’s so very important to our efforts to build strong relationships with University and government scientists, he plays an invaluable role in that very important function.”

- Brian Crawford

Photo credit | URI student Fery Sutyawan '19

NAJIH LAZAR

RESEARCH ASSOCIATE, COASTAL RESOURCES CENTER

Research Associate Najih Lazar spent much of his career working for the Rhode Island Division of Fish and Wildlife, where he used his expertise in fisheries assessment and management to contribute in the reform of the U.S. fisheries conservation. For the last eight years, he has dedicated that knowledge to supporting fisheries research and management in Ghana, Senegal, The Gambia, Malawi, Madagascar and the Philippines where URI's Coastal Resources Center is leading fisheries management programs. As a native of Morocco, he made several contributions in the development of Morocco's fisheries programs such as the recently adopted Blue Belt Initiative, which aims to restore the potential of oceans and wetlands through the introduction of responsible and sustainable approaches that reconcile economic growth and economic security with the conservation of aquatic resources.

Working in Ghana with Brian Crawford, senior coastal resources manager, Lazar worked with a team made up of university researchers and government officials to assess local fish stocks and develop several research and management initiatives. He also guided the research of students at Ghana's University of Cape Coast, Senegal's University of Dakar where he also helped set up laboratories and advised students on fisheries science and assessment methods. He was a key player in the development of the dual-degree program between URI and Ghana's University of Cape Coast.

“Najih has been an outstanding asset,” says Crawford. “He is one of the few people on our staff with a strong background in fisheries biology, which is why he’s been leading aspects of our fisheries stock assessments in our entire international portfolio.”

When he returned from Ghana, Lazar shifted his attention to fisheries issues in Malawi and Madagascar, while also coordinating visits to URI by Ghanaian students. Now, he also works with the Bureau of Fisheries and Aquatic Resources in the Philippines to develop better systems for producing more timely and accurate stock assessments.

“He’s so very important to our efforts to build strong relationships with University and government scientists,” Crawford says. “He plays an invaluable role in that very important function.”



Senior Coastal Resources Manager Brian Crawford and Coastal Resources Center Research Associate Najih Lazar.



INCREASING THE DOSAGE OF SCIENCE EDUCATION

written by **ALLISON FARRELLY '16**





GEMS-Net Teacher Leader Hope Tyrrell presenting new teaching tools and techniques to a group of workshop attendees.



URI Postdoctoral Research Fellow Beth Holland asks a preschool student questions about his knowledge of the nature of science as part of a study with PBS KIDS and the Department of Education's Ready to Learn Program.

Sara Sweetman hopes young children have more opportunities to discover science learning is fun and important to their everyday life.

Nationally, kindergarten to second grade classrooms feature an average of 20 minutes of science education per week — an amount University of Rhode Island (URI) Assistant Professor of Education Sara Sweetman knows is not enough.

However, by influencing the dosage and quality of science education both in the classroom and through media used at home, she hopes young children have more opportunities to discover science learning is fun and important to their everyday life.

Sweetman is the director of URI's Guiding Education in Math and Science Network (GEMS-Net), a research-practice partnership of kindergarten through eighth grade educators and university researchers who have partnered to improve science education for all students in 13 of Rhode Island's school districts.

"Elementary school teachers do not have a formal background in science and so they are often hesitant of teaching science," Sweetman explains. "So we help them build self-confidence and content knowledge while learning new ways to facilitate learning."

The first step in strengthening a science curriculum starts with empowering teachers.



SARA SWEETMAN
Assistant professor
Education



As director of GEMS-Net, Sweetman has worked to ensure that all middle and elementary school teachers in the partnership have the tools, training, and standardized curriculum to teach science education in the classroom four to five days per week, providing all school children equal access to learning opportunities.

“Students coming through the GEMS-Net districts have a sequence of research-based lessons that form a learning progression from kindergarten through Grade 8,” Sweetman says.

The first step in strengthening a science curriculum, Sweetman says, starts with empowering teachers. In addition to providing schools with a core curriculum and teaching tools, each year the nearly 1,000 teachers who are part of the partnership attend workshops at the University where they collaborate with peers, build content knowledge, and interact with URI faculty serving as science mentors.

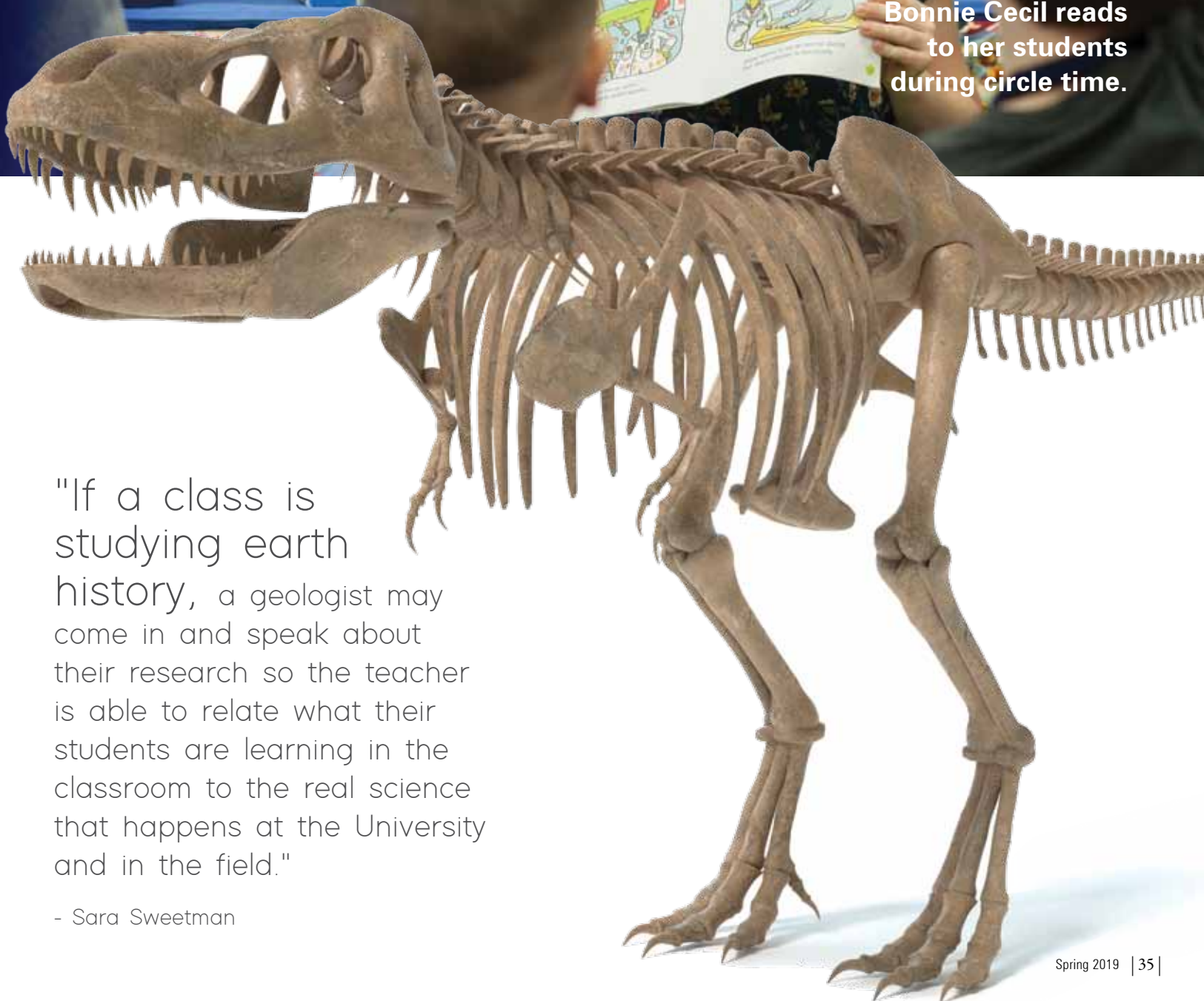
Through the partnership, URI scientists also visit classrooms throughout the year to help localize the science in middle and elementary school curriculums.

“If a class is studying earth history, a geologist may come in and speak about their research so the teacher is able to relate what they’re students are learning in the classroom to the real science that happens at the University and in the field,” Sweetman says.

Stacy Gale, GEMS-Net Teacher Leader is moving beyond the novelty of Virtual Reality to engage students by using this productive research tool.




Preschool teacher Bonnie Cecil reads to her students during circle time.



"If a class is studying earth history, a geologist may come in and speak about their research so the teacher is able to relate what their students are learning in the classroom to the real science that happens at the University and in the field."

- Sara Sweetman



Sweetman's predecessor launched the program as a consortium of five districts in 1990 with funding from the National Science Foundation's Local System Change Grant. Sweetman has grown the project in the last six years to include 13 Rhode Island school districts and secured \$5 million in grant funding during that time.

This year she and her team received an additional \$500,000 in funding to expand the GEMS-Net curriculum to include the ever-growing field of science: computer science. An exploratory Science, Technology, Engineering and Math plus Computing (STEMS+C) Grant from the National Science Foundation (NSF) will help the educators build the foundation for a thoughtful computer science curriculum for schools in Rhode Island.

The first step in implementing such a program, according to Sweetman, is to assess where pre-computer science skills already exist across current curriculums. She and her team will look to identify where computational skills like tinkering, perseverance, and decoding currently exist across math, science, and English language arts. These findings will help GEMS-Net recommend best practices for implementing computer learning to the schools.


Sweetman's interest in advancing science education is not limited to the classroom. Since 2007, she has been working to create media that invites young children of all abilities and cultures to become invested in learning science and engineering through hands-on experience. Her work influences how science education is incorporated into children's digital games and television shows including *Sesame Street* and *The Cat in the Hat Knows a Lot About That*.

"With science and engineering, you often think of it in terms of college-level content, but you would be amazed by the depth of scientific thinking and early conceptual skills and knowledge that young children demonstrate" Sweetman says.

For the past three years, she served as an advisor on a \$100 million Ready to Learn grant awarded to the Corporation for Public Broadcasting (CPB) and PBS Kids by the U.S. Department of Education. This year Sweetman received a one-year, \$300,000 grant to study how children's exposure to media at

"The outreach that is celebrated by the University has made it possible for the GEMS-Net project to sustain and grow. It is a model partnership that effectively bridges research and practice. GEMS-Net will continue to improve opportunities for young children in Rhode Island to engage in science and engineering experiences."

- Sara Sweetman



“We want kids to be able to notice that science is happening all around them, and that they can use their five senses to engage in and investigate the world. When they’re doing that, they’re actually engaging in the act of being a scientist.”

- Sara Sweetman

school and at home affect their understanding and perceptions of science and engineering. The challenge in the study is the lack of tools to measure science and engineering understanding in children so young. Her research team is currently working on developing the instruments with which to measure outcomes.

In one of her favorite story lines from *The Cat in the Hat Knows a Lot About That*, the main characters Nick and Sally disagree about whether people can walk on clouds. The Cat takes them to Mount Know More; on the way, they walk through different states of matter until they reach the clouds and discover they can’t stand on them. Sweetman says that throughout all episodes, the characters challenge their own thinking, and in the end, the payoff is the journey of learning, rather than being right or wrong.

“If you’re only focused on being right, you’re not really learning,” she says. “But if you’re engaging and thinking hard and working toward learning something new — that’s what we want young children’s disposition about education to be. Not to be looking for just the right answer, but to be enjoying the process and developing a desire to learn.”

Sweetman adds: “We want kids to be able to notice that science is happening all around them, and that they can use their five senses to engage in and investigate the world. When they’re doing that, they’re actually engaging in the act of being a scientist.”

Sweetman initially came to the University as a fourth-grade teacher in the GEMS-Net program. She was invited to step out of the classroom to learn at URI as a teacher in residence, she stayed on to earn her Ph.D. and lead the GEMS-Net program.

“The outreach that is celebrated by the University has made it possible for the GEMS-Net project to sustain and grow,” Sweetman says. “It is a model partnership that effectively bridges research and practice. GEMS-Net will continue to improve opportunities for young children in Rhode Island to engage in science and engineering experiences.”



THINKING BIG ABOUT SMALL THINGS: APPLICATIONS AND IMPLICATIONS OF NANOTECHNOLOGY

WRITTEN BY **SHAUN KIRBY '07**

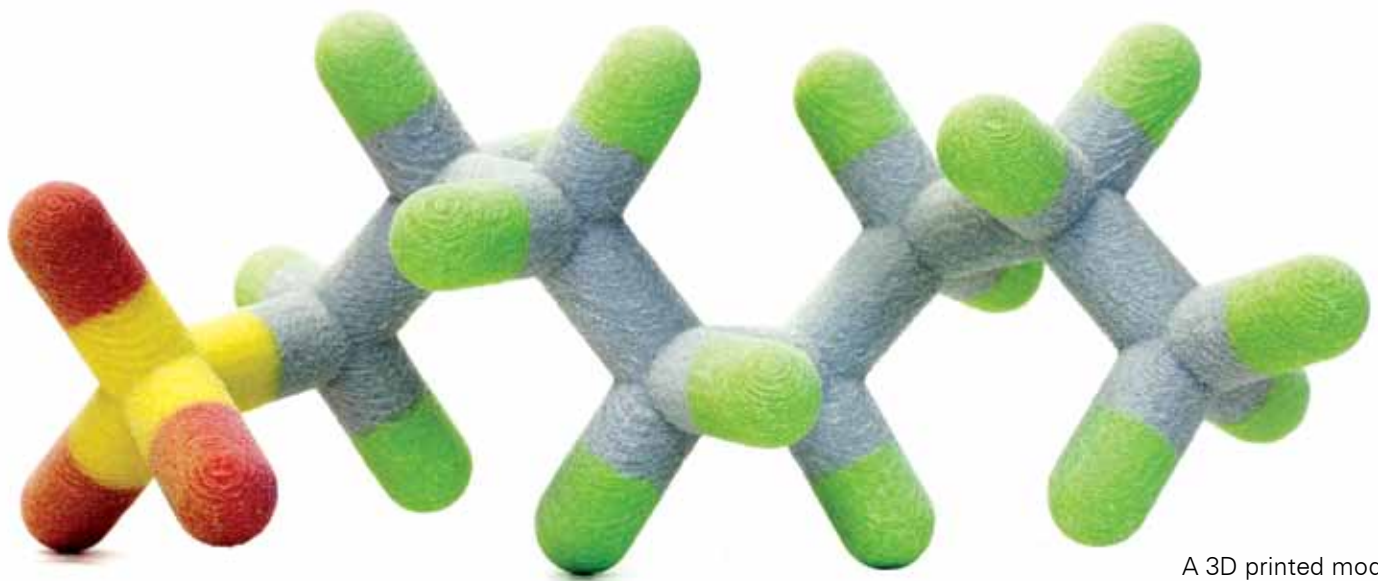
Imagine a vessel that can deliver medicine to an infected human cell. How does it know which cell to target? How does it know not to harm other nearby cells inadvertently?

Think of that same vessel seeking oil particles in the ocean. How does that vessel disperse the oil in a safe and efficient way?

Now picture the vessel 75,000 times smaller than the diameter of a human hair, the size of a nanometer. This is the world where University of Rhode

Island (URI) Professor of Chemical Engineering Geoffrey Bothun conducts research.

For the past 13 years Bothun has led a highly collaborative research group studying the foundational science behind engineered nanoparticles – materials so tiny they can only be observed and manipulated through electron microscopes, powerful tools that magnify the structure of microorganisms and chemicals.



A 3D printed model of perfluorooctane sulfonate, which is a persistent environmental pollutant.

A portrait of Geoffrey Bothun, a man with a beard and short brown hair, wearing a light blue button-down shirt. He is sitting at a dark wooden table with his hands clasped in front of him. The background is a blurred outdoor scene with trees and a building.

GEOFFREY BOTHUN

Professor
Chemical engineering

Bothun's research on nanoparticles holds potential application in both the medical and environmental fields. Through funding from the National Science Foundation (NSF) his research group is creating and testing nanoparticles that can target cells infected by a disease or virus and give them the necessary medicine for treatment.



A liposome sample is being created using a rotary evaporator. The glass flask is partially submerged in a water bath and the plastic beads reduce evaporation from the bath. Liposomes are used as templates for synthesizing nanomaterials.



Gold nanoparticles are used as environmental sensors and therapeutics.

"Generating fundamental knowledge is our primary interest," Bothun says. "Our goal is to expand science and engineering knowledge and identify opportunities for application and technology development."

Bothun's research on nanoparticles holds potential application in both the medical and environmental fields. Through funding from the National Science Foundation (NSF) his research group is creating and testing nanoparticles that can target cells infected by a disease or virus and give them the necessary medicine for treatment. Nanoparticles made of specific metal molecules also can detect complex medical conditions by latching onto cells and acting as beacons for physicians as they test for a suspected disease.

But how do chemical engineers know if these engineered nanoparticles will not cause further harm to the human body? What if the nanoparticle does not do its intended job and makes a disease worse? Answering such questions is critical to Bothun, whose research group is developing model cell membranes common to bacteria or human cells and examining their interactions with nanoparticles of different materials.

"The cell membrane is vital to cell function and separates important intracellular material, such as organelles and DNA, from the outside world," Bothun says. "Researchers widely accept that membrane interactions play an important role in determining whether a nanoparticle is toxic to a cell, but the mechanisms of interaction are unclear. Our goal is to determine how these mechanisms work at a fundamental level so we can help create nanomaterial that don't damage cells and are safer by design."

Bothun's group is not only developing novel research in the biomedical field, but also working to improve

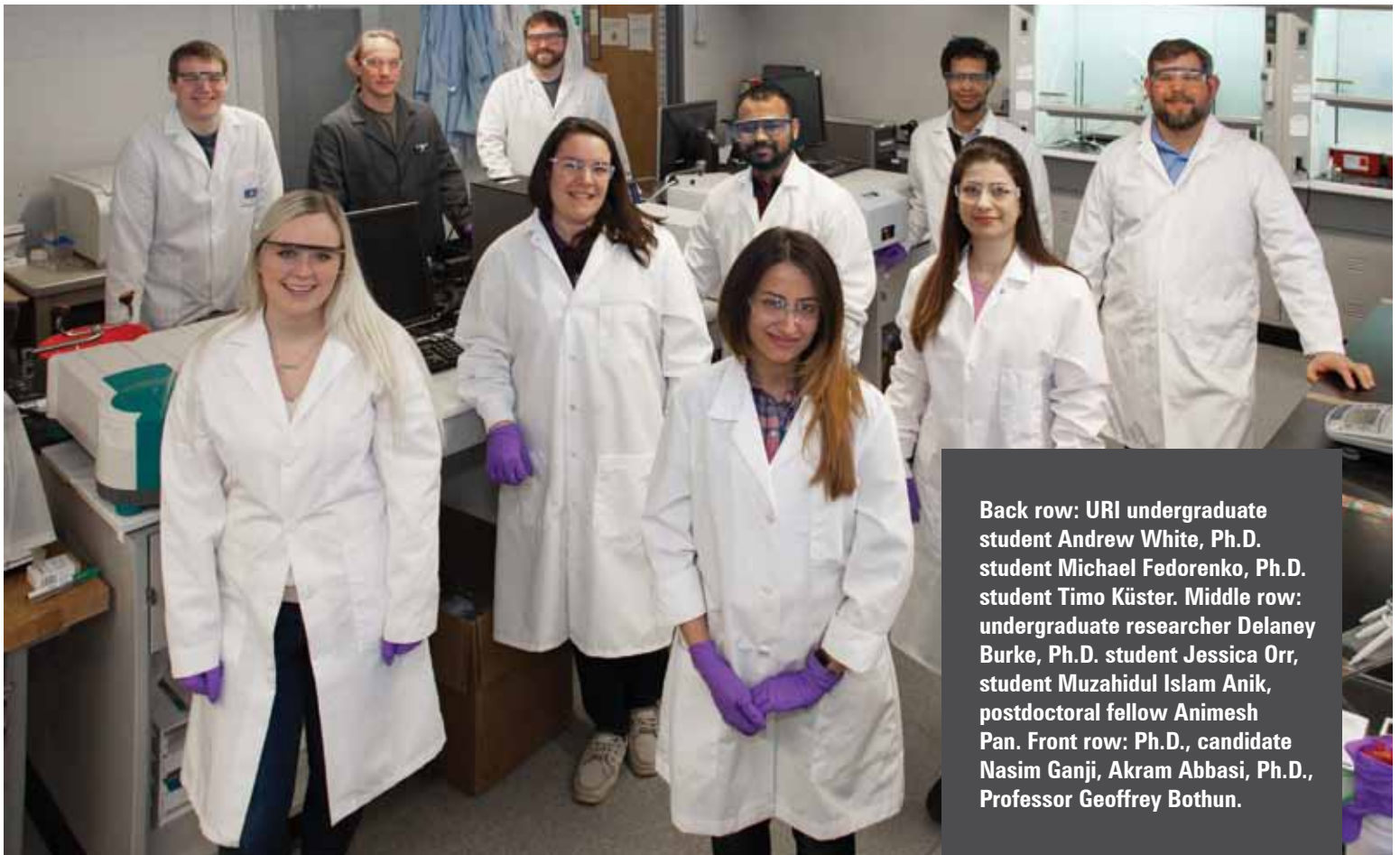
techniques for dispersing oil spilled through man-made disasters. Many of the ocean's microorganisms can survive on oil as a food source, but only if the molecules are small enough to eat.

When the Deepwater Horizon incident occurred in the Gulf of Mexico, that oil failed to break down quickly enough and ultimately washed onto the shoreline, harming vital coastal habitats. Dispersants, however, break down oil into molecules small enough for digestion by microorganisms, reducing the environmental risk.

For the past eight years, Bothun has been funded by the Gulf of Mexico Research Initiative, a program established in response to the 2010 Deepwater Horizon oil spill, to develop materials which aid in oil dispersion, but are also safe if consumed by animals or humans.

"Scientists estimate that roughly 25 percent of the oil from the Deepwater Horizon spill, which was treated using dispersants, deposited in the ocean sediment," says Bothun. "This oil then washes ashore during storms. The processes that lead to sedimentation are complex and involve the attachment of organic and inorganic particles, including bacteria, to the oil droplets, making them heavy and causing them to sink. There is a need to understand how dispersant composition affects these processes, and what will happen when new dispersants are deployed."

Bothun and his team are also involved with larger, cross-institutional projects, which a number of URI faculty are generating novel research. For example, he is developing new sensors for detecting nutrient pollution through the Rhode Island Consortium for Coastal Ecology Assessment, Innovation and Modeling (RI C-AIM), funded by a \$19 million NSF grant and a \$3.8 million match from the state of Rhode Island.



Bothun's group is not only developing novel research in the biomedical field, but also working to improve techniques for dispersing oil spilled through man-made disasters.

As RI C-AIM's project director and principal investigator, Bothun collaborates with groups such as URI's Metcalf Institute for Marine and Environmental Reporting to create professional development opportunities for students and faculty alike, from holding workshops on conducting successful team science, to creating more inclusive research groups.

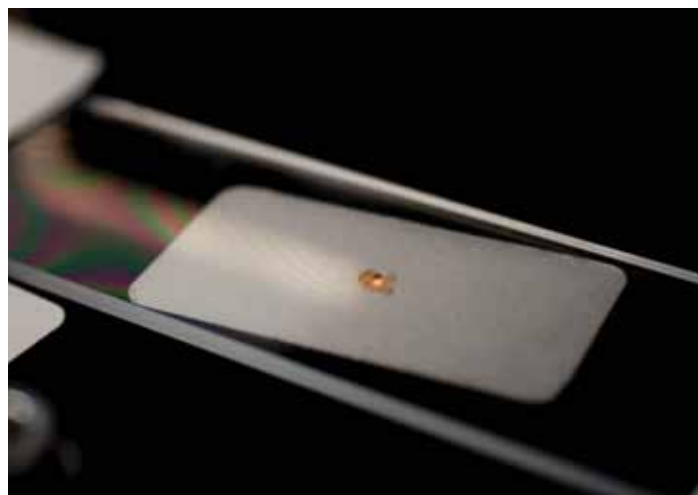
Bothun is also a research co-lead for the National Institute of Environmental Health Sciences (NIH) URI-Harvard Superfund program STEEP: Sources, Transport, Exposure and Effects of poly-and per-fluoroalkyl substances (PFASs) that seeks to understand how PFASs have become an emerging threat to environmental and human health. Since the 1940s, PFASs have entered the environment and our bodies through exposure to common household items such as food packaging, cookware or clothing.



Nasim Ganji and Animesh Pan examine a solution of bacteria grown in the lab. These oil-eating bacteria thrive during marine oil spills.

When the Deepwater Horizon incident occurred in the Gulf of Mexico, that oil failed to break down quickly enough and ultimately washed onto the shoreline, harming vital coastal habitats. Dispersants, however, break down oil into molecules small enough for digestion by microorganisms, reducing the environmental risk.





A microscope slide with a small nanostructured gold substrate is used for detecting molecules via Surface Enhanced Raman Spectroscopy.

"Our mission is to grow scientific knowledge and translate that into information, products or processes that benefit society," Bothun stresses. "This can only be done through interdisciplinary collaboration, and our group is putting those approaches into practice with these initiatives."

Bothun sees his group continuing to develop projects that examine environmental issues and ways to lessen harmful impacts from man-made and natural materials:

"For instance, we have a proposal submitted to the National Science Foundation on how micro- and nanoplastics behave physically and chemically in coastal environments," he says. "We are also in the early stages of developing a new sensing approach for detecting PFASs in the environment."

Without developing successful approaches for student mentorship Bothun knows that any research program is at risk of failure.

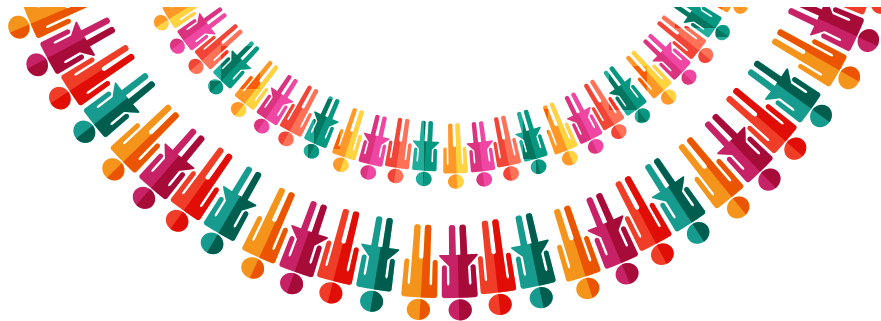
"Students and postdocs are the research engine of any higher education institution, and their success is our success," he says. "The most gratifying thing for me is helping develop and train our students."



A 3D printed model of a protein is used to demonstrate how molecules bind to proteins.



Nursing Professor Serving the **DISADVANTAGED POPULATION**



written by **BETHANY DELOOF '20**

People who have a roof over their head, clothes on their back, and food on their plate don't have to worry about where they will sleep at night or where their next meal will come from, often taking these basic human needs for granted.

When University of Rhode Island (URI) Professor of Nursing Diane Martins was a nurse in New York City in the 1970s, she frequently saw patients discharged from her hospital and onto the street with nowhere to go.

She reached out to then NYC Mayor Koch and created a taskforce that placed homeless people in shelters across the city, which began her career dedicated to serving people in need.

Today, Martins works with vulnerable populations, a term she defines as people who live at increased susceptibility for alterations in their health status or, more simply, increased risk for illness. Martins currently is working on a variety of projects aimed to help vulnerable populations, including a hunger study here in Rhode Island, funded by the President's Partnership on Hunger in Rhode Island grant.

"People should care about this work if we want health care that is culturally and linguistically sensitive, if we want a society that has a goal of social justice, and if we as humans care about the health of the population," Martins says.

She teamed up with the Supplemental Nutrition Assistance Program and the URI Feinstein Center for a Hunger Free America to study hunger in Rhode Island and together they were able to alter the food stamp program in Rhode Island. The initiative allows people to purchase prepared meals through a restaurant meals program.

Other current efforts that Martins is involved in with other URI faculty include: a 2018 Rhode Island Health Workforce Transformation Grant to reduce childhood obesity in Rhode Island; Lifespan Respite grant, funded through the RI Department of Elderly Affairs to offer relief for family caregivers of family members with disabilities; the Ryan White Project, funded by the U.S. Department of Health and Human Services to provide outreach to increase HIV testing in areas of high risk; and a Geriatric Workforce Enhancement Program, which gives health providers essential information needed to care for older adults.

But, Martins says, her long list of accomplishments during her 38 years at URI was not accomplished alone.

"I've done nothing in isolation," she says. "We can't do anything by ourselves. It's a collaborative effort with not only people from your discipline, but with people from other disciplines."



DIANE MARTINS

Professor
Nursing

People who have a roof over their head, clothes on their back, and food on their plate don't have to worry about where they will sleep at night or where their next meal will come from, often taking these basic human needs for granted.

The collaboration she refers to includes the Academic Health Collaborative, a network of health care professionals from URI's College of Nursing, College of Pharmacy and College of Health Sciences, woven together to create a team that contributes thoughts and ideas from the unique perspective of their individual fields.

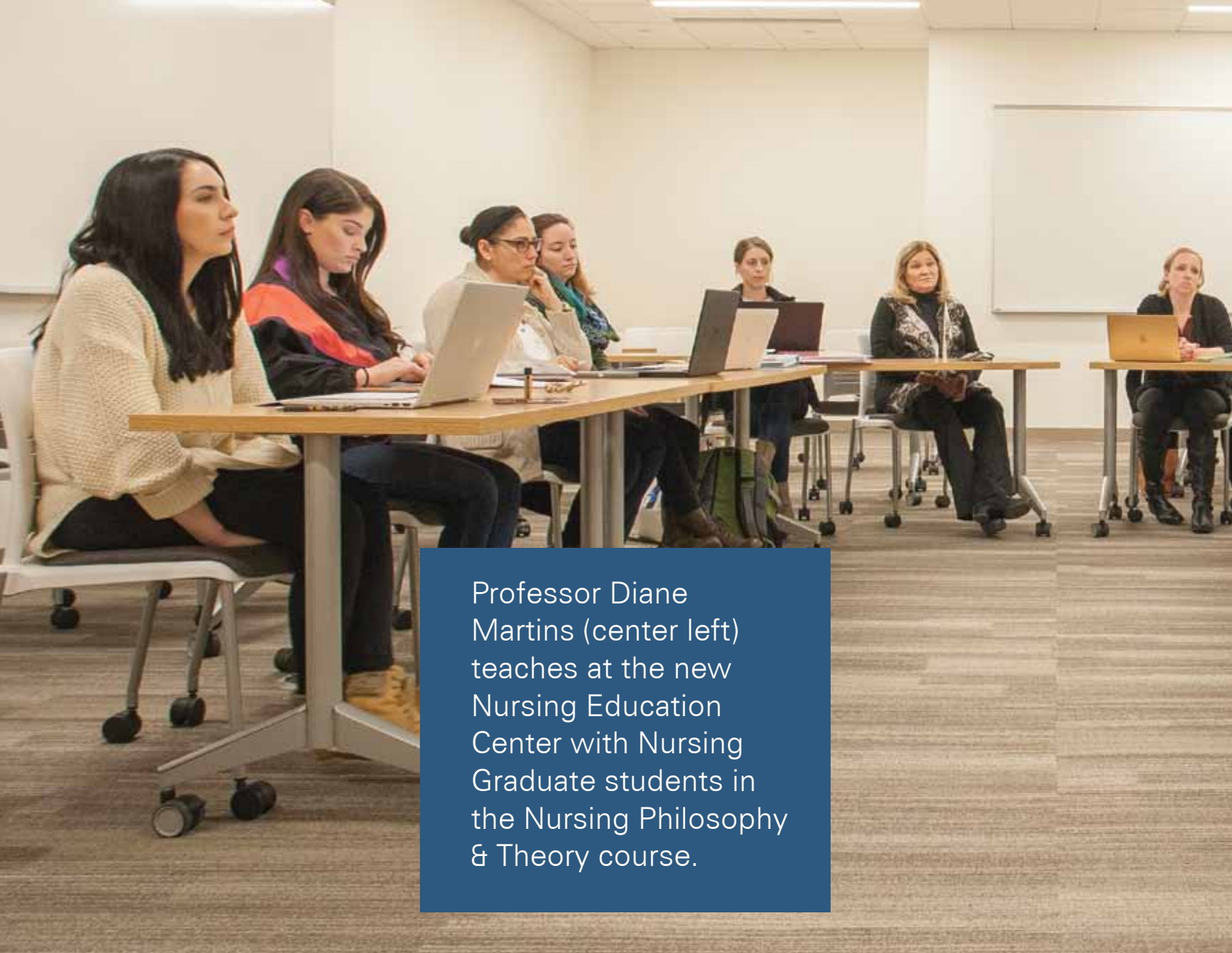
Martins' nursing students work with students from other University departments such as nutrition, physical therapy and psychology, a concept Martins fully supports, adding, "I love having students from other disciplines because it enriches the conversation. It's so essential for us to understand that we need all of us in order to improve the health of the population."

Furthermore, Martins credits URI for her continued success along with the numerous grants and support she has received from the University, whose mission, according to Martins, aligns with her own — to care about the people of Rhode Island.

Martins says she sees real people, vulnerable populations, in need of her help. For her, the people come first and the research second.

"I've always been a person who did service and teaching first, and then, based on what I saw, looked for grants to fund research to try to understand more of what was going on in that population," she says.

This ideology shows in the way Martins approaches her research. Rather than surveying healthcare providers about their attitudes about caring for vulnerable



Professor Diane Martins (center left) teaches at the new Nursing Education Center with Nursing Graduate students in the Nursing Philosophy & Theory course.



Professor Diane Martins.

populations, such as the homeless, as has been typical of other studies, she takes a different angle, focusing instead on the homeless persons perceptions of our health care system to gain insight and discover ways to better serve the population.

"I felt it was very important for us as health care providers, as researchers, to say, 'Can you share with us what your healthcare experience has been like,' to go to the people themselves to share their stories," she says.

Not only do vulnerable populations benefit from Martins' work, her nursing students do as well. By being exposed to real-life situations such as working with people experiencing homelessness, incarceration, or being an immigrant, the students gain caretaking skills they otherwise wouldn't learn in the classroom.

These students also gain an important life lesson – an appreciation for diversity.

"The more exposure you have as a student to people that are different than yourself your ability to appreciate and respect that culture increases," Martin explains. "And, hopefully, they become better nurses."



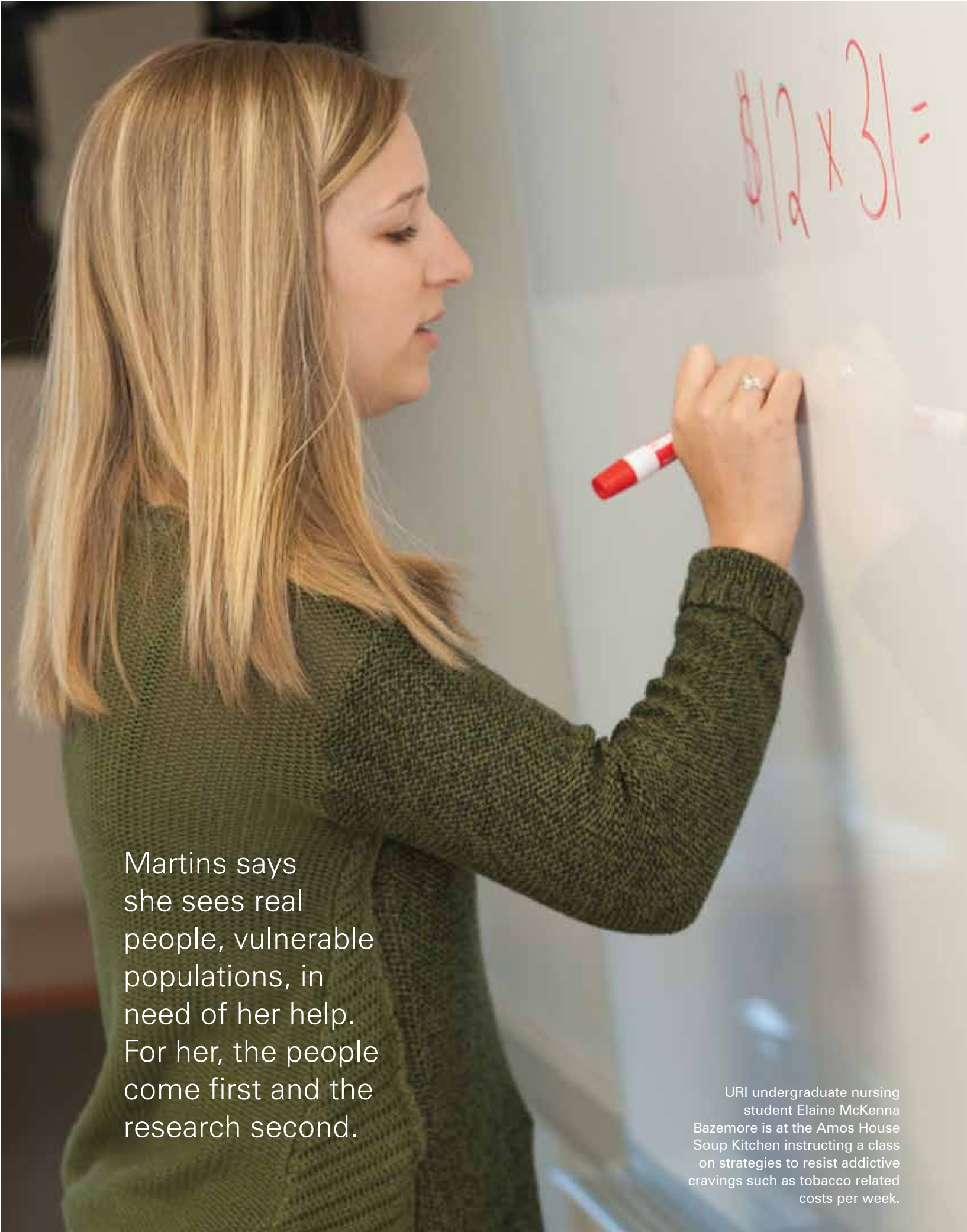


"I felt it was very important for us as health providers, as researchers, to say, 'Can you share with us what your experience has been like?'"

- Diane Martins



URI graduate nursing student Abdessamad (Sam) El Adnani researches the population of homeless people who use emergency rooms for care.



Martins says
she sees real
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For her, the people
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URI undergraduate nursing
student Elaine McKenna
Bazemore is at the Amos House
Soup Kitchen instructing a class
on strategies to resist addictive
cravings such as tobacco related
costs per week.



“The research opened my eyes to how patient care could change in a positive way.”

- Janelle Amoako

JANELLE AMOAKO '20

Family Nurse Practitioner Graduate Student

As an undergraduate student at the University of Rhode Island (URI), Janelle Amoako worked closely with Professor Diane Martins and worked tirelessly at internships, volunteer experiences, and jobs at URI for a broader experience. As an undergraduate research assistant in the College of Nursing, Amoako focused her research on how older adults function better at home, interviewing people to determine how to best care for their needs and asking an essential question, “What does home mean to you?”

Amoako’s achievements at URI extend beyond her courses. She conducted service work in the Dominican Republic and established URI’s Multicultural Student Nurses Association.

Amoako is now a registered nurse and works on a medical-surgical unit at the Miriam Hospital in Providence, Rhode Island – while earning a nurse practitioner master’s degree at URI. In addition, she currently works as a teacher’s assistant for the College of Nursing and continues to maintain multiple activities in this setting as well as in the larger RI community.

“Currently I volunteer on the board for the African Alliance of Rhode Island and as a Lifespan high school mentor,” Amoako says. “I complete blood pressure screenings in the community for Lifespan and am part of the Rhode Island State Nurses Association Governance Committee. As a teacher assistant I provide tutoring for nursing students and classroom support.”

She attributes her success as a nurse to her work with Martins, saying this work gave her not only research experience but also perspective on the importance of its implementation for patient care. She emphasizes the need for up-to-date, relevant, and significant information to provide the best possible quality, patient-centered care.

“The research opened my eyes to how patient care could change in a positive way,” she says. “It’s valuable in how I communicate with my patients.”



ACADEMIC SUMMIT 2019:

Inspiring Research and Scholarship
Convergence at URI

WRITTEN BY **ARIA MIA LOBERTI '20**



History Professor Rod Mather.

On January 17, 2019, University of Rhode Island (URI) faculty, staff, and community gathered for the 11th annual Academic Summit. The program, which was carefully designed by a team of faculty throughout the University, inspired and encouraged convergence in research, scholarship and creative works. Presentations, panels and breakout sessions were attentively curated to trigger discussion of and planning for new projects and initiatives that will springboard URI's leadership in an ever-evolving world.

URI's Vice President of Research and Economic Development, Professor of Biomedical and Pharmaceutical Sciences, and Art and Art History, Peter Snyder,



OR T O N


spearheaded the event, speaking about how cross-disciplinary and multidisciplinary approaches shaped and changed his experiences both as an individual and as an academic. In the plenary address, he elucidated the life-changing significance of mentorship and support, from which he benefitted as a student, practicing artist and neuroscientist.

Today as a scientist, artist and administrator, Snyder says he continues to be fueled by collaborative efforts and the innovative results such work can build: "This background provides a framework for considering the importance of developing convergent ideas and

methodologies. It can serve as inspiration for the University's future projects and initiatives."

"The aim of the summit," Snyder says, "was to explore the possibility of one or more signature initiatives that have potential to address complex world issues and can build on current faculty strengths across URI."

The summit involved eight breakout sessions, led by faculty, that focused on topical areas where the University must turn its attention. These ranged in topics from facing the problem of food security to stimulating support for arts and humanities initiatives. Each session produced a plan of action or problem-solving agenda. Each problem requires

A full-page background image showing a diver in a vibrant, multi-colored wetsuit (red, orange, yellow, and black) exploring a coral reef. The diver is wearing a black mask and a scuba tank is visible on their back. The water is clear, and the coral reef is diverse with various species of coral and sea urchins. The diver's arm is extended, and they appear to be reaching towards the reef. The overall scene is a high-quality underwater photograph.

merging multiple disciplines or specialties to address a pressing global environmental or societal issue.

One session, addressing the topic of fake news, has already inspired action — an April 2019 symposium organized by Department of History faculty. The event featured four speakers who described the historical impact of several key events for which scientific data were intentionally mis-reported for public consumption. This first public symposium may become an annual event, with the potential to forge new collaborative efforts between the Department of History and the Harrington School of Communication and Media.

The most well-attended breakout session focused on addressing the remediation of plastics and micro-plastics contaminating the world's oceans.



Two other sessions also addressed issues pertinent to fostering critical thinking, information literacy, and the clear articulation of values or principles. One session addressed the problematic politicization of the higher education system and of the research it produces; another emphasized growing challenges in definitive, accessible science communication. URI, which remains openly opposed to the perpetuation of publicly-funded academic research for purely economic or political gain, remains committed to deliberately addressing these virulent sociopolitical problems.

One idea that emerged from the symposium sessions might be to launch a new special competency certificate program to provide students with the tools to evaluate complex empirical information. A second idea involves extending the already-present infrastructure across public universities with cooperative agricultural extension offices, to piggy-back a network for the promotion of science communication literacy. Such a modern extension service would foster communicative competencies and logical reasoning skills, and to reach members of the general community, media, high school system, and higher education system.

The most well-attended breakout session focused on addressing the remediation of plastics and micro-plastics contaminating the world's oceans.

Faculty attendees debated how URI can champion initiatives in technology, policy-making, community education, and plastics retrieval processes. Ideas ranged from developing an action plan to phase out disposable plastic products across the URI campus and building partnerships across Rhode Island and New England, as well as tapping into existing URI global research relationships. This topic is a top priority for U.S. Senator Sheldon Whitehouse, (D-RI) and may be a mechanism through which URI can foster global collaboration.

Snyder plans to authorize a preliminary \$50,000-minimum investment from the University's research division, which URI can launch one or more of these projects during the 2020 fiscal year. These initial funds will be used for strategic planning purposes, such as convening one or more "think tank" meetings for URI researchers to collaborate with leaders from other institutions to highlight and explore solutions for specific issues — essentially continuing the work that began at the Academic Summit.

The richness and diversity of the University environment is uniquely suited to addressing the multifaceted challenges explored at the Academic Summit.

"At a research university, we all have unique opportunities for anyone in any discipline, and in just a few moments, to strike up a collaborative relationship," Snyder says. "We have access to just about any creative and scholarly discipline that humanity has been able to imagine thus far. This creates a really special place that does not exist outside of university settings."

URI's increasing presence in the global community, continued growth, and innumerable resources invite the potential for strategically and directly facing these enormously important global issues.



PHOTO CONTEST 2019 WINNERS



1ST PLACE

THE ENDLESS BOND BETWEEN MOTHER AND CHILD

by Matt Palasciano '20

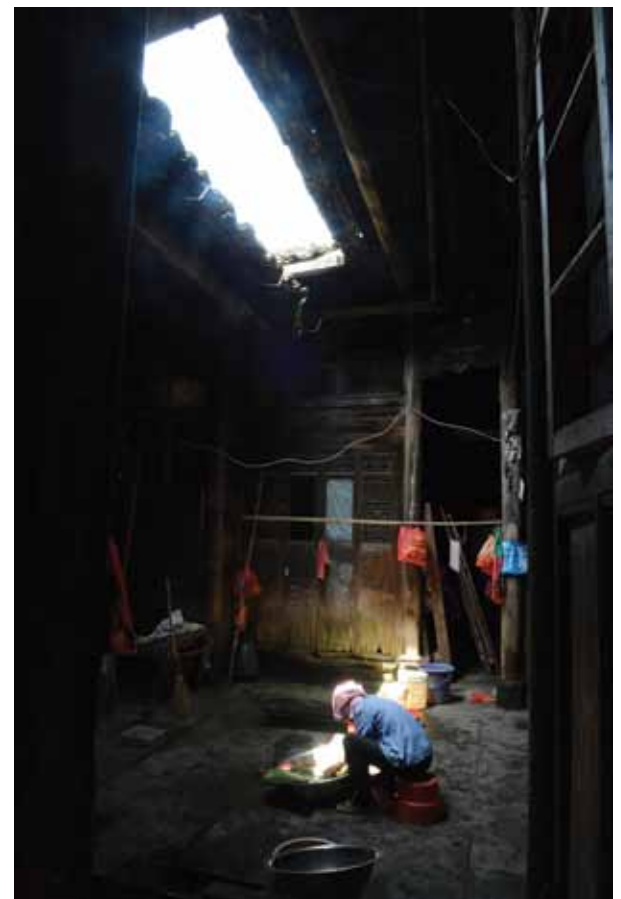
A young macaque clings to its mother at the local watering hole in Ubud, Bali, Indonesia, where Palasciano studied biodiversity, hydrology and water resource management. He and two other students studied deforestation and illegal logging in Indonesia to understand the destruction it imposes on wildlife and its habitat. Palasciano is pursuing a bachelor's degree in geological oceanography and plans to pursue a master's degree in coastal geology and business administration. He hopes to work in cultural resource management and as a professional shark diver in the Bahamas. Palasciano is from Thomaston, Connecticut.

2ND PLACE

ALL THE WATER RETURNS TO HALL

by Professor Yeqiao Wang

This rural village home in southern China is designed to collect rainwater from all directions through a rectangular opening in its sloped roof. The water is stored in a stone cellar underneath the central hall. This photograph showcases the wisdom of a sustainable rural routine presented by this hundred-year-old eco-friendly house. Professor Wang is currently leading and engaging more than 300 scholars and practitioners from URI and around the world to develop a multi-volume book series entitled *The Handbook of Natural Resources*. This photo was taken during one of his field trips for the series. Professor Wang is originally from China.





3RD PLACE

RAINING SPARKS

by Laird French '21

This photograph of burning steel wool being spun on a rope was taken using an 8-second shutter speed as part of a project for ART 214, or Photography 1, for a long-exposure photo assignment. French is pursuing a bachelor's degree in marketing with an expected minor in fine arts and plans to move to Hawaii and become a professional photographer/videographer after graduation. French is from Kingston, Rhode Island.

HONORABLE MENTION 1

FUNGI GUTTATION

by Riley Kirk '23

This photograph shows a frost bolete mushroom that is experiencing a rapid growth phase. The yellow droplets on the pores are not dew, but the result of a process known as guttation — when a mushroom exudes fluid during high metabolic times. After this photo was taken in the Great Swamp Management Area in West Kingston, Rhode Island, the mushroom was collected and brought back to the laboratory for extraction and isolation experiments. Kirk is from Charlestown, Rhode Island.



HONORABLE MENTION 2

YELLOW WARBLE AT NEST

by Stephen Brenner '18

This photograph, taken in Manitoba, Canada, depicts research with the McWilliams Lab in Biological and Environmental Sciences monitoring the demographics, breeding success, and growth rates of long-distance migratory birds at the far northern reaches of their range in shifting habitats and climate. Brenner is originally from Buffalo, New York.

HONORABLE MENTION 3

REEF MANTA

by Assistant Professor Jason Jaacks

Jaacks shot this photograph while free diving in Raja Ampat, Indonesia. The reef manta was cruising through a cloud of plankton. Jaacks, was working on a short film about sustainable fisheries practices in Indonesia, as part of a multi-year visual study of the biodiversity of the Coral Triangle region of the south Pacific. Jaacks is originally from Denver, Colorado.



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